Notes of a military reconnaissance from Fort ...

William H. (William Hemsley) Emory, Corps of Topographical Engineers, J W Abert, Philip St. ...

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THIRTIETH CONGRESS—FIRST SESSION.

Ex. Doc. No. 41.

NOTES OF A MILITARY RECONNOISSANCE,

FROM

FORT LEAVENWORTH, IN MISSOURI,

TO

SAN DIEGO, IN CALIFORNIA,

INCLUDING PART OF THE

ARKANSAS, DEL NORTE, AND GILA RIVERS.

BY LIEUT. COL. W. H. EMORY.

MADE IN 1846-7, WITH THE ADVANCED GUARD OF THE "ARMY OF THE WEST."

FEBRUARY 9, 1848.—Ordered to be printed.

FEBRUARY 17, 1848.—*Ordered*, That 10,000 extra copies of each of the Reports of Lieutenant Emory, Captain Cooke, and Lieutenant Abert, be printed for the use of the House; and that of said number, 250 copies be furnished for the use of Lieutenant Emory, Captain Cooke, and Lieutenant Abert, respectively.

WASHINGTON:

WENDELL AND VAN BENTHUYSEN, PRINTERS.

1848.

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LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING

A communication from the Colonel of the corps of Topographical Engineers, enclosing copies of the reports of Lieutenant Emory, of portions of the report of Captain Cook, of the report of Lieutenant Abert, and of the journal kept by Captain Johnston, in compliance with a resolution of the House of Representatives of the 17th January, 1848.

War Department,
Washington, February 9, 1848.

Sir: In compliance with a resolution of the House of Representatives of the 17th ultimo, I have the honor to transmit herewith a communication of the colonel of the corps of topographical engineers, enclosing copies of "the report and map of Lieutenant Emory, of the topographical engineers, of the route of the army under General Kearny, from the Missouri river to the Pacific ocean, with such parts of the report of Captain Cook as related to his deviation from such route, and the reports and map of Lieutenant Abert, of the same corps, of his examinations in the province of New Mexico." I also transmit herewith a copy of the "journal of the expedition, kept by Captain Abraham R. Johnston."

These, with the documents communicated on the 24th ultimo, comprise all those required by the resolution above referred to.

Very respectfully, your obedient servant,

W. L. MARCY,
Secretary of War.

Hon. Robert C. Winthrop,
Speaker of the House of Representatives.

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NOTES

OF

A MILITARY RECONNOISSANCE,

FROM

FORT LEAVENWORTH, IN MISSOURI, TO SAN DIEGO, IN CALIFORNIA,

INCLUDING

PART OF THE ARKANSAS, DEL NORTE, AND GILA RIVERS.

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INSTRUCTIONS, AND EXPLANATORY REMARKS.

WASHINGTON, *September* 1, 1847.

To Col. J. J. ABERT,
Chief of the Corps of Topographical Engineers:

SIR: The following order was received by me June 5th, 1846:

BUREAU OF TOPOGRAPHICAL ENGINEERS,
Washington, June 5, 1846.

SIR: You will repair, without delay, to Fort Leavenworth, and report yourself and party to Colonel Kearny, 1st dragoons, as field and topographical engineers of his command. In addition to yourself, the party will consist of—

First Lieutenant Warner, now at Washington;
Second Lieutenant Abert, do.
Second Lieutenant Peck.

Lieutenant Peck is at West Point, but he has been ordered to repair to St. Louis, and report to you at that place. Should Colonel Kearny be at St. Louis, which you will ascertain on passing through that place, you will report to him at St. Louis.

Although ordered to report as field and topographical engineers, under the regulations, you will not consider these in the light of exclusive duties, but will perform any military duty which shall be assigned to you by Colonel Kearny in accordance with your rank.

Should Colonel Kearny have moved on the prairies with his command, you will make every effort to overtake him.

Respectfully, sir, your obedient servant,

J. J. ABERT,
Colonel Topographical Engineers.

To Lieut. W. H. EMORY, *Top. Eng.*

Anticipating that the route of Colonel Kearny's command would be through unexplored regions, your suggestions required, that in all cases where it did not interfere with other and more immediate military demands of the service, the attention of myself, and the officers assigned to duty with me, should be employed in collecting data which would give the government some idea of the regions traversed.

The column commanded by Colonel Kearny, to which we were attached, styled "The Army of the West," to march from Fort Leavenworth, was destined to strike a blow at the northern provinces of Mexico, more especially New Mexico and California.

It was supposed we would barely reach Fort Leavenworth in time to join the army, and but twenty-four hours were allowed us

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in Washington to collect the instruments and other conveniences for such an expedition. This was quite sufficient for all the objects appertaining directly to our military wants, but insufficient for the organization and outfit of a party intended for exploration. In submitting the following notes, they should be received as observations made at intervals snatched from other duties, and with an expedition whose movements were directed by other considerations than those which would influence the views and conveniences of an explorer.

We left Washington on the 6th of June, unable to procure a pocket chronometer, or telescope of power sufficient to observe eclipses; but through your intercession, and by the kindness of the Chief of Hydrography, U. S. N., we were provided with two excellent box chronometers, No. 783 and No. 2,075, by Parkinson and Frodsham, and we received from the bureau two of Gambey's 8½-inch sextants.

Crossing the Alleghanies the stage capsized with us, and placed the chronometers in great danger, but the prudence of Mr. Bestor, who carried them in a basket on his arm, saved them from destruction. Their rates were changed very materially by the accident, but subsequent observations showed no other injury had been incurred.

Elaborate observations for time and rate were made at St. Louis; from which place, being tolerably well established in geographical position, it was intended to carry the longitude by chronometer, but, on reaching Fort Leavenworth, the chronometers were again found to have changed their rates materially, owing to the peculiarly unsteady and jarring motion of the steamer upon which we ascended.

The meridian of Fort Leavenworth, as determined by Mr. Nicollet, is therefore taken as that to which all the determinations of longitude as far as Bent's fort, by the chronometer, are referred, and any change which subsequent observations may make in the longitude of Fort Leavenworth, will be common to them. The travelling rates of chronometer 783 were, as the observations will show, very uniform, and longitudes deduced from it, compared with direct measurements of lunar distances made at various points, give satisfactory comparisons as far as camp 70, October 9th, on the Rio del Norte. At this point we left the wagons, thence crossing the mountains to the Gila river, some irregularity in the rates is discoverable, until we reach camp 83, October 26th, on the Gila river.

From that point (camp 83) to San Diego, on the Pacific, the rates were very uniform. Assuming Captain Belcher's determination of that point, 7*h*. 48*m*. 44*s*., west from Greenwich, and carrying my longitudes back, they compare well with the longitudes derived from the direct measurements of lunar distances made at different points on the route.

The longitude between the camps of October 9th and October 26th, are derived from direct measurements, and from lunar distances.

Of the latitudes.

The latitudes were determined by measuring with one of the Gambey sextants the double altitudes of stars near the meridian, and at all important points by observations on north and south stars as nearly as they could be obtained of equal altitudes. At these

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last points, where the observations are multiplied, their places may be depended upon to the nearest five seconds.

Of local time.

The local time was, in all cases, determined by altitudes of the heavenly bodies on different sides of the meridian.

The astronomical observations, in number, were computed, in the first place, by myself and Mr. Bestor, and subsequently by Professor J. C. Hubbard. The results, as given in the appendix, are the final computations of Professor Hubbard, whose well-earned reputation as a computer entitles his work to entire confidence. These observations establish the geographical position of 52 points, extending from Fort Leavenworth to the Pacific, most of which lie in regions before undetermined.

Heights above the sea.

At Fort Leavenworth, through the liberality of the medical department, I was furnished with a syphon barometer, by Bunten, No. 515, the comparison of which, with the standard at Paris, is given in the subjoined note.

Observatoire.—Comparaison du baromètre à Syphon, No. 515 de Bunten, *avec le baromètre* de l'observatoire.

Paris, le.. 1843

Le baromètre No. 515, donne des hauteurs plus grandes que celles qui sont indiquées par le baromètre de l'observatoire, la différence est de 0.45 centièmes de millimètre.

Baromètre,	No. 515	759.19
	Observatoire	758.74
	Différence	+0.45

Baromètre de.

	L'observatoire.		No. 515.	
12.9	758.20	+0.40	758.60	12.5
12.0	761.50	+0.50	762.00	11.8
11.3	762.14	+0.56	762.70	11.0
10.3	758.06	+0.44	758.50	10.0
8.7	753.80	+0.35	756.15	8.8
		2.25		
		+0.45		

Paris, *le* 3 *Fevrier*, 1843.

GORYOZ.

The discussion of the data upon which the heights indicated by the barometer have been founded, would, if pursued, occupy some space; for the present, it will be sufficient to say that the basis of

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comparison, as far as Santa Fé, is a series of observations made at Fort Leavenworth, with the same instrument, running through two years; and the height of the hospital at Fort Leavenworth above the sea assumed at 912 feet.

From Santa Fé, down the Del Norte, and thence west as far as camp 83, of October 26th, the basis of comparison is the series of observations, running through two months, at Santa Fe.

From the camp of October 26th, on the Gila, the basis of comparison is the mean of the observations made at San Diego, on the Pacific, near the level of the sea. The barometer was left on the Pacific, under the charge of Lieutenant Warner, topographical engineers; and the further observations made with it on that coast will afford, at some future time, data upon which to reconsider the results now given, particularly those in the last section. In the absence of corresponding observations, the object has been, to get a column of reference, progressing west, with the places observed at.

The formula nsed is that of Altman's. The heights deduced are marked on the map; but they should be considered, at best, but as near approximations to the truth.

The time of day at which the observations were made is not that which experience has shown to be best; but, the halts being beyond my control, I was compelled to yield to circumstances.

As far as Santa Fé, I received the assistance of Lieutenants J. W. Abert and G. W. Peck, of the corps of topographical engineers; both of whom had but too recently returned from an exploring expedition in less favored climates, and fell ill—the first at Bent's fort, and the last at Santa Fé.

From Santa Fé to the Pacific, I was aided by First Lieutenant W. H. Warner, of the topographical engineers, and Mr. Norman Bestor; all of whom deserve notice for the zeal and industry with which they performed their duty. Whilst with me, Lieutenant Peck made the topographical sketches; after he left, they were made by Lieutenant Warner.

I would here gladly avail myself of the opportunity of thanking Colonel Robert Campbell and Dr. Engelmann,* of St. Louis, for the disinterested and efficient aid they rendered us in St. Louis in our hurried preparations for a long and tedious journey. The advice given us by Colonel Campbell, a gentleman of great experience in prairie life, was felt beneficially to the last of the journey.

The country between Fort Leavenworth and Santa Fé, traversed by the army of the west, may be divided into three great divisions, distinct in character, climate, and products, viz: from Fort Leavenworth to Pawnee fork, from Pawnee fork to Bent's Fort, and from Bent's Fort to Santa Fé.

The two first divisions have been so often traversed, that I have omitted my diary embracing them, contenting myself with a few general remarks; but the scientific, and especially astronomical observations referring to them, are as full as in regard to the other regions.

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* An interesting account of the cacti observed on the route, furnished by Dr. Englemann, will be found in Appendix No. 2, continued.

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For the information of detachments moving on that route, a table of distances has been prepared; which, with the map, (though on rather too small a scale for military purposes,) may enable movements to be made without other guides.

Between Fort Leavenworth and Pawnee fork, the country is a high, rolling prairie, traversed by many streams, the largest of which is the Kansas, or "Kaw;" and all but this river may be forded, except during freshets.

The beds of the streams are generally deeply indented in the soil, and their banks almost vertical, developing, where the streams make their incisions in the earth, strata of fossiliferous limestone, of various shades of brown, filled with the remains of crinoidea.

On a branch of the Wah-Karrussi, where the Oregon trail strikes it, a seam of bituminous coal crops out. This is worked by the Indians, one of whom we met driving an ox-cart loaded with coal, to Westport. For the most part, the soil is a sandy loam, covered with rich vegetable deposite; the whole based upon a stratum of clay and limestone.

Trees are to be seen only along the margins of the streams, and the general appearance of the country is that of vast, rolling fields, enclosed with colossal hedges. The growth along these streams, as they approach the eastern part of the section under consideration, consists of ash, burr oak, black walnut, chesnut oak, black oak, long-leaved willow, sycamore, buck-eye, American elm, pig-nut hickory, hack-berry, and sumach; towards the west, as you approach the 99th meridian of longitude, the growth along the streams becomes almost exclusively cotton-wood. Council Grove creek forms an exception to this, as most of the trees enumerated above flourish in its vicinity, and render it, for that reason, a well-known halting-place for caravans, for the repairs of wagons, and the acquisition of spare axles.

On the uplands the grass is luxuriant, and occasionally is found the wild tea, (amorpha canescens,) and pilot weed, (silphium lacinatum;) the low grounds abound in prickly rush, narrow leafed asclepias, white flowering indigo, flowering rush, spotted tulip, bedstraw, wild burgamot, spider wort, pink spider wort, pomme blanche, (psoralea esculenta,) scarlet malva, pilot weed, hazel, button bush, wild strawberry, cat-tail, and arrow rush.

As you draw near the meridian of Pawnee Fork, 99° west of Greenwich, the country changes, almost imperceptibly, until it merges into the arid, barren wastes described under that section. The transition is marked by the occurrence of cacti and other spinose plants, the first of which we saw in longitude 98°.

Near the same meridian the buffalo grass* was seen in small quantities, and, about noon, our party was cheered for the first time by the sight of a small "band" of buffalo, two of which we killed, at the expense of a couple of fine horses, which never recovered from the chase. Horses occasionally fed on grain become very weak feeding on grass alone, and should never in that condition be subjected to quick work. A violation of this precept

* For a description of this famous grass, see Appendix No. 2.

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has cost many volunteers their horses, and entailed trouble without end on many inexperinced travellers "westward bound." The next day immense herds of the buffalo were seen.

We were now on ground (see map of July 10th) which is traversed by the nomadic tribes of Pawnees, Sioux, Osages, and occasionally the Comanches. Their range is seldom farther east than Council Grove. The country thence, to the western borders of Missouri, is in the hands of Indians owing allegiance to, and receiving stipends from the United States; they live in log-houses, cultivate the soil, rear cattle, and pursue some of the arts of peace. They form the connecting link between the savage of the plains and the white man of the States.

The latitude of our camp, a few thousand feet southeast of where the road crosses the Pawnee Fork, is 38° 10′ 10″; and the longitude, by chronometer, is 98° 55′ 22″. The height above the sea, indicated approximately by the barometer, is 1,932 feet; the point, as will be seen on the map, is but a short distance from the junction of the Pawnee Fork and the Arkansas river.

The section of country embraced between this point and Bent's Fort is totally different in character from that just described, but the change is gradual, and may be anticipated from what has been said in referrence to the appearance of the country so far east as the 98th degree, or even the 97th meridian.

The position of our camp near Bent's Fort, determined by 29 altitudes of polaris and 35 circum-meridian altitudes of alpha aquilæ, is 38° 02′ 53,″ and the longitude, by the measurement of distances between ☾ and the ∗ alpha aquilæ and the ∗ spica virginis, is 103° 01′, agreeing within 34*s*. with the chronometric determination of the same point.—(See Appendix.)

Our route from Pawnee Fork to this point, was along the Arkansas river. The approximate height of Bent's Fort above the sea is 3,958 feet, and the height where we first struck the river, at the bend, is 1,658 feet, the distance between these two points being 311 miles, the fall of the river is about seven feet and four-tenths per mile. Its bed is of sand, sometimes of rounded pebbles of the primitive rock. It is seldom more than 150 yards wide, and, but for the quicksands, is every where fordable. The bottom land, a few feet above the level of the water, varies in width from half a mile to two miles, and is generally covered with good nutritious grass. Beyond this the ground rises by gentle slopes into a wilderness of sand hills on the south and into prairie on the north. There are one or two exceptions; for instance, at the great bend, the sand hills from the south impinge abruptly on the course of the river; at Pawnee rock, a long swell in the ground terminates in an abrupt hill of highly ferruginous sand stone; and ten miles above Choteau's island, the hills along the river are vertical, as if the river had cut a passage through them; and as you approach Bent's Fort, the hills generally roll in more boldly on the river, and the bottoms become narrower, and the grass more precious.

At these places the geological formation can be seen distinctly. On the lower part of the river it is a conglomerate of pebbles, sometimes shells cemented by lime and clay overlaying a stratum

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of soft sand stone, which, in turn, over lays a blue shale, and sometimes the richest description of marl.

Higher up the river, we find the same formation, but in addition argillaceous lime stone, containing amonites and other impressions of shells in great variety, and in more than one instance distinct impressions of oyster shells. The dip in both cases about 6°, and a little north of east.

The soil of the plains is a granitic sand, intermixed with the exuviæ of animals and vegetable matter, supporting a scanty vegetation. The eye wanders in vain over these immense wastes in search of trees. Not one is to be seen. The principal growth is the buffalo grass, cacti in endless variety, though diminutive, yucca angustifolia, (soap plant,) the Darlingtonia brachyloba, schrankia uncinata, prairie gourd (cucurbita aurantia,) and very rarely that wonderful plant, the Ipomea leptophylla, called by the hunter man root, from the similarity of its root in size and shape to the body of a man. It is esculent, and serves to sustain human life in some of the many vicissitudes of hunger and privation to which men who roam the prairies, as an occupation, are subjected.

July 24—Near the dry mouth of the Big Sandy creek, the yucca angustifolia, palmillo of the Spaniards, or soap plant, first made its appearance, and marked a new change in the soil and vegetation of the prairies.

The narrow strip which I have described as the bottom land of the Arkansas, varying from half a mile to two or three miles wide, contains a luxuriant growth of grasses, which, by the judicious selection and distribution of the camps, sustained all the animals of the army of the west whilst on the river. The only tree of any magnitude found on its course is the cotton-wood, (populus canadensis,) and it frequently happens that not one of these is seen in a whole day's journey, and the buffalo dung and wild sage constitute the only fuel to be procured. About 35 miles before reaching Bent's Fort is found what is called the "big timber." Here the valley of the river widens, and the banks on either side fall towards it in gentle slopes. The "big timber" is a thinly scattered growth of large cotton woods not more than three quarters of a mile wide, and three or four miles long. It is here the Chyennes, Arapahoes, and the Kioways sometimes winter, to avail themselves of the scanty supply of wood for fuel, and to let their animals browse on the twigs and bark of the cotton-wood. The buffaloes are sometimes driven by the severity of the winter, which is here intense for the latitude, to the same place to feed upon the cotton-wood. To this point, which has been indicated to the government as a suitable one for a military post, Mr. Bent thinks of moving his establishment.

In addition to the grasses and cotton-wood mentioned, we find in the bottoms wild plum, wild cherry, willow, (salix longifolia,) summer grape, (vitis æstivalis,) cat-tail, (typha latifolia,) scouring rush, (equisetum hyemale,) a powerful diurectic upon horses, commelina angustifolia, Mexican poppy, (argemone Mexicana,) monarda fistulosa, coreopsis tinctoria, psoralea esculenta, cassia chamærcrista,

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several varieties of solidego, œnothera, and helianthus; among which was the common sunflower.

The animals of this section of the country are the buffalo, deer, antelope, elk, marmot, wolf, agama cornuta, &c.; but, for a more specific knowledge of the natural history and herbarium of the region from Fort Leavenworth to Bent's Fort, reference is made to the interesting notes of one of my assistants, Lieutenant Abert, in appendix No. 6.

Except the buffalo, game is very scarce, and cannot be depended upon to support a party of men, however small their number. The buffalo, where they range, may be relied upon to support a column of many thousand men; but their range is very uncertain. This year it was westward, between the 98th degree and the 101st meridian of longitude.

For an account of the country from Bent's Fort to the Pacific, I submit my notes, in which I have set down what passed under my own observation.

The accompanying map is also limited chiefly to the route followed, based upon the data exhibited in the appendices, and numbered from 3 to 5.

For a more specific knowledge of the plants peculiar to the country traversed than will be found in the journal, I refer to the catalogue prepared by that eminent botanist, Dr. John Torrey, to whom all the plants and drawings were submitted—forming appendix No. 2. The specimens brought home to aid me in elucidating the geology of the route, were submitted to Professor John Frazer, of the Pennsylvania University, to whose learning and knowledge I am under great obligation.

The military force under Colonel Kearny, destined for the conquest of New Mexico and the countries beyond, consisted of two batteries of artillery, (6-pounders,) under the command of Major Clark, three squadrons of the first dragoons, under Major Sumner, the first regiment of Missouri cavalry, under Colonel Doniphan, and two companies of infantry, under Captain Agney. This force was detached in different columns from Fort Leavenworth, and were concentrated with admirable order and precision on the 1st of August, at a camp nine miles below Bent's Fort.

And here I would take occasion to speak of the excellent understanding which prevailed throughout between regulars and volunteers, and the cheerfulness with which they came to each others assistance whenever the privations and hardships of the march called for the interchange of kindly offices among them. The volunteers, though but recently accustomed to the ease and comforts of smiling homes, bore up against fatigue, hunger, and the vicissitudes of a long and tedious march, through unexplored regions, with a zeal, courage, and devotion that would have graced time-worn veterans, and reflect the highest credit on their conduct as soldiers. There was a noble emulation in the conduct of regulars and volunteers, which, in no small degree, benefitted the service; while, at the same time, it promoted that cordiality in their interests which will make their future meetings, in the more peaceful walks of life, a gladsome event to both.

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NOTES.

August 2, 1846.—I looked in the direction of Bent's Fort, and saw a huge United States flag flowing to the breeze, and straining every fibre of an ash pole planted over the centre of a gate. The mystery was soon revealed by a column of dust to the east, advancing with about the velocity of a fast walking horse—it was "the Army of the West." I ordered my horses to be hitched up, and, as the column passed, took my place with the staff.

A little below the fort, the river was forded without difficulty, being paved with well attritioned pebbles of the primitive rock, and not more than knee deep.

We advanced five miles along the river, where its bed slides over a black carbonaceous shale, which has been mistaken for coal, and induced some persons to dig for it.

Here we turned to the left, and pursued our course over an arid elevated plain for twenty miles, without water. When we reached the Timpas, we found the water in puddles, and the grass bad.

Colonel Doniphan was ordered to pursue the Arkansas to near the mouth of the Timpas, and rejoin the army by following the bed of that stream.

Near where we left the Arkansas, we found on the side of the slope several singular demi-spheroids, about the size of an umbrella, coated with carbonate of lime, in pyramidal crystals, which, at a distance, resembled the bubbles of a huge boiling caldron.

Along the Arkansas the principal growth consists of very coarse grass, and a few cotton-woods, willows, and euphorbia marginata. The plains are covered with very short grass, sesleria dactyloides, now burnt to cinder; artemisia, in abundance; Fremontia vermicularis; yucca angustifolia, palmillo, of the Spaniards; verbena; eurotia lanata, and a few menzelia nuda.

The only animals seen were one black-tailed rabbit and an antelope; both of which were killed.

Our march was 26 miles, that of the army 37; the last 20 miles without water.

The artillery arrived about 11, p. m.; both men and horses were parched with thirst. The teamsters, who had to encounter the dust, suffered very much. When water was near, they sprang from their seats and ran for it like mad men. Two horses sank under this day's march.

Our ascent was considerable to-day. The height, indicated by the barometer, being 4,523 feet above the level of the sea.

August 3.—We ascended the Timpas six and three-quarter miles,

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and halted for the day near running water; the grass was all burned dry, and not a green sprig to be seen. Three buttes were passed of singular appearance; some idea of which will be given by the sketch. They were composed of lime-stone, and were garnished at their bases with nodules of carbonate of lime, like those described yesterday. A part of our road was on the dry bed of a river, paved with argillaceous lime-stone, containing, now and then, the impression of oyster shells very distinctly. The valley in which we are now encamped presents the appearance of a crater, being surrounded with buttes capped with stunted cedar, (juniperus Virginianus.) The stratification, however, appears regular, and to correspond on different sides of the valley.

The growth of to-day was similar to that found on the plains yesterday, to which may be added an evergreen and a magnificent cactus three feet high, with round limbs shaped like a rope, three and a half inches in diameter, branching at right angles. It is said the Mexicans make hedges of it.

Colonel Doniphan's regiment passed our camp about 4, p. m.

The water was in pools, charged with vegetable matter and salt.

The formation of the adjacent hills was distinct; first, a stratum of lime-stone, ten feet thick, then hard sand-stone, with amonites and a variety of other shells, &c., overlaying blue marl. From the sides of the hills protruded geodes, with crystallized lime-stone, and the ground was everywhere strewed with detached pieces of ferruginous sand-stone. On these hills we found cedar growing, very stunted; Missouri flax; several varieties of wild currants; a very stunted growth of plums; moss and cacti in great variety, but diminutive.

The latitude of this camp, by nine observations on Polaris, out of the meridian, is 37° 44′ 56″.

The longitude derived from the chronometer, by an estimate of the local time derived from eight measurements of the double altitude of arcturus on the west, and seven of alpha aquilæ in the east, is 6*h*. 54*m*. 06.7*s*.

The barometer reading indicates a height above the sea of 4,761 feet.

August 4.—The road wound through the valley of the Timpas. The soil, being impregnated with lime, rendered the dust, which rose in dense columns, distressing.

Dwarfed cedar skirted the road on each side. The strata of hills on either side of the valley were the same as described yesterday; but the ferruginous nodules and blocks of sand-stone were more frequent.

Thirteen miles' march brought us to the crossing of the Timpas. The only water we found there was in a hole 40 feet in diameter, into which the men rushed with great eagerness, disturbing the vegetable deposit formed on its surface, and thereby rendering it unfit for use. Nine miles farther on we came to "the hole in the rock"—a large hole filled with stagnant, though drinkable, water.

We saw at times, during the day, a few antelopes, rabbits, wild

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horses, two jack dams, (magpie,) meadow larks, king birds, and bob o'lincolns.

The pasture was so bad that Colonel Kearny determined to march to the "hole in the prairie," the neighborhood of which, though said to be destitute of water, affords some dry grass.

We passed a dead horse belonging to the infantry, black, with crows, and a wolf in their midst, quietly feeding on the carcase. This gave us unpleasant forebodings for our noble, but now attenuated, horses.

We reached the "hole in the prairie" at 10, p. m., the distance being 14½ miles, and found grass, as we expected: we were agreeably surprised to find water also. The night was delicious, and all slept in the open air. The infantry were encamped here.

The total distance to-day was 36 miles. The horses were now falling away in an alarming manner, but the mules seem to require the stimulus of distention, and nothing else: this the dry grass affords.

On the march, about sunset, the Wattahyah (twin hills) rose suddenly to view, south 75° west; and then Pike's peak, 20 or 30 degrees farther to north. At the same time the dim outline of the great spine of the Rocky mountain chain began to show itself. We were now crossing the dividing line between the waters of the Timpas and those of the Purgatory, or Los Animos, of the Spaniards.

The vegetation was the same as that of yesterday, as far as we could judge from its burned and parched condition; to which may be added a plant described by Dr. Torrey, as physalis perbalis, and one eriogonum tomentosum.

Height of this camp 5,560 feet.

August 5.—To-day we descended eleven and a half miles, and reached the valley of the Purgatory, called, by the mountain men, Picatoire, a corruption of Purgatoire, a swift-running stream, a few yards in width, but no grass of any amount at the crossing. The blighted trunks of large cotton-wood and locust trees were seen for many miles along its course, but the cause of decay was not apparent.

The growth of the bottom, which is very narrow, was black locust, the everlasting cotton-wood, willow, wild currants, hops, plum and grape, artemisia, clematis Virginiana, salix, in many varieties; and a species of angelica, but no fruit was on the bushes. Beyond this stream five and a half miles, we encamped on the bed of a tributary to the Purgatory, which comes down from the north side of the Raton, or Mouse, which is the name given to a chain of ragged looking mountains that strikes the course of the Purgatory nearly at right angles, and separates the waters of the Arkansas from those of the Canadian. The banks of the Purgatory, where this stream debouches, begin to assume something of a mountain aspect, different from scenery in the States. The hills are bare of vegetation, except a few stunted cedars; and the valley is said to be, occasionally, the resort of grizzly bear, turkeys, deer, antelope, &c.

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Passing the rear wagons of the infantry, we found their horses almost worn out, and the train followed by wolves.

Captain Cook, of the 1st dragoons, was sent ahead the day before yesterday, to sound Armijo. Mr. Liffendorfer, a trader, married to a Santa Fé lady, was sent in the direction of Taos, with two Pueblo Indians, to feel the pulse of the Pueblos and the Mexican people, and, probably, to buy wheat if any could be purchased, and to distribute the proclamations of the colonel commanding.

Yesterday Wm. Bent, and six others, forming a spy-guard, were sent forward to reconnoitre the mountain passes. In this company was Mr. F. P. Blair, jr., who had been in this country some months, for the benefit of his health.

Measured 13 double altitudes of polaris, in the north, for latitude, and 7 of alpha aquilæ, in the east, for local time, and the resulting latitude is 37° 12′ 10″, and longitude 6*h*. 56*m*. 48*s*. The height indicated by the barometer is 5,896 feet.

August 6.—Colonel Kearny left Colonel Doniphan's regiment and Major Clarke's artillery at our old camp-ground of last night, and scattered Sumner's dragoons three or four miles up the creek, to pass the day in renovating the animals by nips at the little bunches of grass spread at intervals in the valley. This being done, we commenced the ascent of the Raton, and, after marching 17 miles, halted with the infantry and general staff, within a half-mile of the summit of the pass. Strong parties were sent forward to repair the road, which winds through a picturesque valley, with the Raton towering to the left. Pine trees (pinus rigida) here obtain a respectable size, and lined the valley through the whole day's march. A few oaks, (quercus olivaformis,) big enough for axles, were found near the halting-place of to-night. When we first left the camp this morning, we saw several clumps of the pinon, (pinus monophyllus.) It bears a resinous nut, eaten by Mexicans and Indians. We found also the lamita in great abundance. It resembles the wild currant, and is, probably, one of its varieties; grows to the height of several feet, and bears a red berry, which is gathered, dried, pounded, and then mixed with sugar and water, making a very pleasant drink, resembling currant cordial. We were unfortunate in not being able to get either the fruit or flower. Neither this plant, the pinon, nor any of the plum trees, nor grape vines, had any fruit on them; which is attributable to the excessive drought. The stream, which was last year a rushing torrent, is this year dry, and in pools.

The view from our camp is inexpressibly beautiful, and reminds persons of the landscapes of Palestine. Without attempting a description, I refer to the sketch.

The rocks of the mountain were chiefly a light sandstone—in strata, not far from horizontal; and the road was covered with many fragments of volcanic rocks, of purplish brown color, porous, and melting over a slow fire.

The road is well located. The general appearance is something like the pass at the summit of the Boston and Albany railroad, but the scenery bolder, and less adorned with vegetation.

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An express returned from the spy-guard, which reported all clear in front. Captain Cook and Mr. Liffendorfer have only reached the Canadian river. It was reported to me that, at Captain Sumner's camp, about 7 miles above where we encamped last night, and 12 miles from the summit, an immense field of coal crops out; the seam being 30 feet deep. To-night our animals were refreshed with good grass and water.

Nine observations on polaris give, for the latitude of the place, 37° 00′ 21″.

Seven on arcturus, in the west, and 7 on alpha aquilæ, in the east, give the chronometric longitude 6*h*. 57*m*. 01.35*s*.

Height above the sea, 7,169 feet.

August 7, *camp* 36.—We recommenced the ascent of the Raton, which we reached with ease, with our wagons, in about two miles. The height of this point above the sea, as indicated by the barometer, is 7,500 feet. From the summit we had a beautiful view of Pike's peak, the Wattahyah, and the chain of mountains running south from the Wattahyah. Several large white masses were discernible near the summits of the range, which we at first took for snow, but which, on examination with the telescope, were found to consist of white limestone, or granular quartz, of which we afterwards saw so much in this country. As we drew near, the view was no less imposing. To the east rose the Raton, which appeared still as high as from the camp, 1,500 feet below. On the top of the Raton the geological formation is very singular, presenting the appearance of a succession of castles. As a day would be required to visit it, I was obliged to forego that pleasure, and examine it merely with the glass. The mountain appears to be formed chiefly of sandstone, disposed in strata of various shades of color, dipping gently to the east, until you reach near the summit, where the castellated appearance commences, the sides become perpendicular, and the seams vertical. The valley is strewed with pebbles and fragments of trap rock, and the fusible rock described yesterday, cellular lava, and some pumice.

For two days our way was strewed with flowers; exhilarated by the ascent, the green foliage of the trees in striking contrast with the deserts we had left behind, they were the most agreeable days of the journey. Among the flowers and shrubbery was the campanula rotundifolia, (hare bell,) sida coccinea, galium triflorum, the snowberry, eriogonum, geranium Frémontii, clematis virpuenna, ranunculus aquatilis, euphorbia marginata, linum perenne, malva pedata, lippia cuneifolia, and many pretty varieties of convolvulus.

There is said to be a lake, about ten miles to the east of the summit, where immense hordes of deer, antelope, and buffalo congregate, but may be doubted.

The descent is much more rapid than the ascent, and, for the first few miles, through a valley of good burned grass and stagnant water, containing many beautiful flowers. But frequently you come to a place where the stream (a branch of the Canadian) has worked itself through the mountains, and the road has to ascend and then descend a sharp spur. Here the difficulties com-

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mence; and the road, for three or four miles, is just passable for a wagon; many of the train were broken in the passage. A few thousand dollars judiciously expended here, would be an immense saving to the government if the Santa Fé country is to be permanently occupied, and Bent's Fort road adopted. A few miles from the summit we reached a wide valley where the mountains open out, and the inhospitable looking hills recede to a respectable distance to the right and left. Sixteen miles from camp 36 brought us to the main branch of the Canadian, a slow running stream, discharging a volume of water the thickness of a man's waist. We found here Bent's camp. I dismounted under the shade of a cotton-wood, near an ant-hill, and saw something black which had been thrown out by the busy little insects; and, on examination, found it to be bituminous coal, lumps of which were afterwards found thickly scattered over the plain. After crossing the river, and proceeding about a mile and a quarter, I found the party from which I had become separated encamped on the river, with a plentiful supply of grass, wood, and water; and here we saw, for the first time, a few sprigs of the famous grama, Atheropogon oligostaclyum.

The growth on to-day's march was piñon in small quantities, scrub oak, scrub pine, a few lamita bushes, and, on the Canadian, a few cotton-wood trees; except at the camp, there was little or no grass. The evening threatened rain, but the clouds passed away, and we had a good night for observations. We have had no rain since we left Cow creeks, thirty days ago.

We are now in what may be called the paradise of that part of the country between Bent's Fort and San Miguel; and yet he who leaves the edge of the Canadian or its tributaries must make a good day's march to find wood, water, or grass.

There may be mineral wealth in these mountains, but its discovery must be left to some explorer not attached to the staff of an army making forced marches into an enemy's country.

To-day commenced our half-rations of bread; though not suffering for meat, we are anxious to seize on Santa Fé and its stock of provisions as soon as possible.

August 8.—We remained in camp all day to allow Colonel Doniphan's regiment and the artillery to come up. During the day, we had gusts of wind, and clouds discharging rain to the west. Captain Sumner drilled his three squadrons of dragoons, and made quite an imposing show.

The latitude of the camp is 36° 47′ 34″; the longitude 6*h*. 56*m*. 59.7*s*.

On the 7th, I measured 8 altitudes of arcturus in the west, and 8 of alpha aquilæ in the east; and, on the 8th, 10 of arcturus and 8 of alpha aquilæ—showing the rate of chronometer 783 to be losing 3*s*. per day.

The height determined approximately, is 6,112 feet above the sea.

August 9.—We broke up camp at 2½ o'clock, and marched with the colonel's staff and the first dragoons 10½ miles, and encamped

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under the mountains on the western side of the Canadian, on the banks of a small stream, a tributary of the Canadian. The grass was short, but good; the water in small quantities, and in puddles. Here we found a trap-dyke—course north 83 west—which shows itself also on the Canadian, about four miles distant in the same course.

At the distance of six miles from last night's camp, the road forks—one fork running near the mountains to the west, but nearly parallel to the old road, and never distant more than four miles, and almost all the time in sight of it. The army was divided—the artillery, infantry, and wagon train ordered to take the lower, and the Missouri volunteers and first dragoons the upper road. The valley here opens out into an extensive plain, slightly rolling, flanked on each side by ranges of perpendicular hills covered with stunted cedar and the piñon. In this extensive valley or plain may be traced by the eye, from any of the neighboring heights, the valleys of the Canadian and its tributaries, the Vermejo, the Poni, the Little Cimarron, the Rayada, and the Ocaté. We saw troops of antelopes, horses, deer, &c.; also cacti in great abundance, and in every variety; also a plant which Dr. De Camp pointed out as being highly balsamic; and having collected quantities of it during his campaign to the Rocky mountains, and tested its efficacy as a substitute for balsam cop.

To-night we observed a great number of insects, the first remarked since leaving the Arkansas. Birds were equally rare, with the exception of the cow-bunting, which has been seen in great numbers on the whole route, and in a state so tame as to often alight on our horses. The horned frog (agama cornuta) also abounds here, as well as on the route westward from Chouteau's island.

August 10.—Colonel Kearny was dissatisfied with the upper road, and determined to strike for the old road. We did so after reaching the Vermejo, 9½ miles in a diagonal line, and rejoined it at the crossing of the Little Cimarron, where we found the infantry encamped—total distance 20½ miles. The grass good, and water plenty, though not flowing. Another trap-dyke, parallel nearly to the last, and three mile distant, presented its wall-like front. It was strewed with fragments of fernigenous sand-stone and crystalized carbonate of lime.

A Mexican came into camp from Bent's Fort, and reported Lieutenant Abert much better. Colonel Kearny allowed him to pass to Taos, which place (60 miles distant by a bridle path) he expected to reach to-night. The colonel sent by him copies o[illegible] proclamation.

Five Mexicans were captured by Bent's spy company; they were sent out to reconnoitre our forces, with orders to detain all persons passing *out* of New Mexico. They were mounted on diminutive asses, and presented a ludicrous contrast by side of the big men and horses of the first dragoons. Fitzpatrick, our guide, who seldom laughs, became almost convulsed whenever he turned his well practised eye in their direction.

Mr. Towle, an American citizen, came to head-quarters at the Ver-

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mejo, and reported himself just escaped from Taos. He brought the intelligence that, yesterday, the proclamation of Governor Armijo reached there, calling the citizens to arms, and placing the whole country under martial law; that Armijo has assembled all the Pueblo Indians, numbering about 2,000, and all the citizens capable of bearing arms; that 300 Mexican dragoons arrived in Santa Fé the day Armijo's proclamation was issued, and that 1,200 more were hourly expected; that the Mexicans to a man were anxious for a fight, but that half the Pueblo Indians were indifferent on the subject, but would be made to fight.

A succession of thunder storms passed yesterday to the north and west, but did not reach us. The ground indicates recent rain, as also does the grass, which looks as in the spring, just sprouting. The hills to the left, as near as I can judge, the same as in the Raton, were of different colored sand stone, regularly stratified, and dipping gently to the east, topped by a mural precipice of green stone. The growth on the mountains, piñon and cedar. On the plains, which are covered with scoriæ, scarcely a tree is to be seen.

We encamped on the little Cimarron, and observed at night for latitude and time. 7 altitudes of polaris give for the latitude 36° 27′ 50″; 7 on arcturus in the west, and the same number on alpha aquilæ in the east give the meridian by chronomoter differences 6*h*. 58*m*. 39*s*. Approximate height 6,027 feet.

The plants of to-day, in addition to many of plants heretofore mentioned, were the Erysinum Arkansanum, lippa cuneifolia, myosotis glomerata, so frequently found on the plains, lytherus linearis, hypercium ellipticium, several verbenas, and several new varieties of oxybaphus, wild sage, and on the streams a few cottonwood and willows.

August 11.—We made a long march to-day with the advanced guard and the 1st dragoons, to the Ocaté, 31¾ miles. The road approaches the Ocaté, at the foot of a high bluff to the north, where the river runs through a cañon, making it inaccessible to animals. We ascend the river for four or five miles, to where the road crosses; there we left the road, and at that point, the river being dry, continued to ascend it a mile, and found good grass, and, occasionally, running water. The scenery to-day was very pretty, sometimes approaching to the grand; the road passed through a succession of valleys, and crossed numerous "divides" of the Rayada and Ocaté. The Rayada is a limpid running stream, ten miles from the little Cimarron, the first of the kind noted, though we have been traversing the bases of many mountains for days past. The pasture, however, is not good. At points two and four miles farther, at the foot of the mountains, there are springs and good grass. At the last point we overtook the infantry, where they halted. About five miles before reaching the Ocaté, the road descends into a valley, overhung by confused and rugged cliffs, which give promise of grass and water, but, on going down, we found that this beautiful valley had no outlet, but terminated in a salt lake. The lake is now dry, and its bed is white with a thin saline encrustation. Here the road is indistinct, and takes a sudden turn to the left.

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At this moment we discovered coming towards us, at full speed, Bent's spy-guard. All thought they had met the enemy; I was ordered to ride forward to meet them, followed by Mr. Fitzpatrick and two dragoons. It proved to be a false alarm; they had missed their road, and were galloping back to regain it.

The hills are composed principally of basalt and a porous volcanic stone, very hard, with metallic fracture and lustre, traversed by dykes of trap. The lava is underlayed by sand stone. From the uniform height of these hills, one would think they originally formed the table land, and that the valleys had been formed by some denuding process, and their limits determined by the alternate existence or non-existence of the hard crust of volcanic rocks.

Matters are now becoming very interesting. Six or eight Mexicans were captured last night, and on their persons was found the proclamation of the Prefect of Toas, based upon that of Armijo, calling the citizens to arms, to repel the "Americans, who were coming to invade their soil and destroy their *property and liberties;*" ordering an enrolment of all citizens over 15 and under 50. It is decidedly less bombastic than any Mexican paper I have yet seen. Colonel Kearny assembled these prisoners, altogether some ten or twelve, made a speech to them, and ordered that, when the rear guard of the army should have passed, they should be released. These men were not deficient in form or stature; their faces expressed good nature, bordering on idiocy; they were mounted on little donkies and jennies, guided by clubs instead of bridles.

Two more Mexicans, of a better class, were captured to-night, or rather they came into camp. Their story was, that they had come out by order of the alcalde of the Moro town to look out for their standing enemies, the Eutaws, who were reported in the neighborhood. That they had heard of our advance some time since, but believed us to be at the Rayada, 22 miles back; but seeing our wagons, and having faith in the Americanos, they rode without hesitation into our camp. When they said they had faith in us, the colonel ordered them to shake hands with him. They were ordered to be detained for a day or two, for it was quite evident to all they were spies, who had come too suddenly into the little ravine in which we were encamped.

They appeared well pleased, and one of them, after proceeding a few steps with the guard, turned back and presented the colonel with a fresh cream cheese.

The grass was interspersed with a great variety of new and beautiful flowers—the œnothera; Stanley pinnatifida; anemone Pennsylvania; eriogonum tomentosum; erysinum, Arkansanum, &c. &c. The hills were sparsely covered with cedar and piñon. Antelopes and horned frogs in abundance, but no other animals were seen.

Height of this camp 6,916 feet.

August 12.—The elder Mexican was discharged, giving him two proclamations; one for the alcalde, another for the people of his town. A message was sent to the alcalde to meet us at the crossing of the Moro, with several of his chief men. The other Mexican was retained as a guide. About 12 o'clock the advance was

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sounded, and the colonel, with Sumner's command, marched 20 miles, and halted in a beautiful valley of fine grass and pools of cool water, where the wild liquorice (glycyrrhiza lepidota) grew plentifully. The stream, where flowing, is a tributary of the Moro.

From the drift wood, &c., found in its wide, well-grassed bed, I infer it is subject to great freshets. In crossing from the Ocaté to the valley of the Moro, the mountains become more rolling; and as we approached the Moro, the valley opened out, and the whole country became more tame in its appearance.

Ten miles up the Moro is the Moro town, containing, we were informed, 200 houses.

It is off the lower road; but a tolerable wagon road leads to the village from our camp of last night.

The plains were strewed with fragments of brick-dust colored lava, scoriæ and slag; the hills, to the left, capped with white granular quartz. The plains are almost destitute of vegetation; the hills bear a stunted growth of piñon and red cedar. Rains have fallen here recently, and the grass in the bottoms is good. The grama is now found constantly. We saw to-day some ground squirrels, with stripes on their sides: in their habits, resembling the common prairie dog. A flight of birds was seen to the south, but too distant to distinguish. We were attracted to the left by an object which was supposed to be an Indian, but, on coming up to it, it was discovered to be a sand-stone block standing on end and topped by another shorter block. A mountain man, versed in these signs, said it was in commemoration of a talk and friendly smoke between some two or three tribes of Indians.

The latitude of the place, from 7 observations on polaris, is 35° 54′ 21″, and the longitude, deduced from the local time by 7 altitudes of alpha lyræ in the west, and 11 of ⊙ in the east, was 6*h*. 59*m*. 49*s*.

The height above the sea 6,670 feet.

August 13.—At 12 o'clock, as the rear column came in sight, the call of "boots and saddles" was sounded, and in 20 minutes we were off. We had not advanced more than one mile when Bent, of the spy-guard, came up with four prisoners. They represented themselves to be an ensign and three privates of the Mexican army, sent forward to reconnoitre and ascertain our force. They said 600 men were at the Vegas to give us battle. They told many different stories; and finally delivered up a paper, being an order from a Captain Gonzales to the ensign, to go forward on the Bent's Fort road to ascertain our position and numbers. They were corss-examined by the colonel, and detained.

As soon as we commenced the descent into the valley of the Moro creek, some one reported a company of Mexicans at the crossing; Colonel Kearny ordered me to go forward with twelve of the Laclède rangers, and reconnoitre the party, and if they attempted to run, to pursue and capture as many as we could. As Lieutenant Elliot and myself approached this company, they appeared to be motionless, and on coming up, we found them to consist of

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nothing but the pine stakes of a corrál. The dragoons were sadly disappointed; they evidently expected either a fight or a chase. Six miles brought us to the first settlement we had yet seen in 775 miles. The first object I saw was a pretty Mexican woman, with clean white stockings, who very cordially shook hands with us and asked for tobacco. In the next house lived Mr. Boney, an American, who has been some time in this country, and is the owner of a large number of horses and cattle, which he manages to keep in defiance of wolves, Indians, and Mexicans. He is a perfect specimen of a generous open-hearted adventurer, and in appearance what, I have pictured to myself, Daniel Boone, of Kentucky, must have been in his day. He drove his herd of cattle into camp and picked out the largest and fattest, which he presented to the army.

Two miles below, at the junction of the Moro and Sapillo, is another American, Mr. Wells, of North Carolina; he has been here but six months, and barring his broad-brimmed sombrero, might have been taken for a sergeant of dragoons, with his blue pantaloons with broad gold-colored stripes on the sides, and his jacket trimmed with lace. I bought butter from him at four bits the pound.

We halted at the Sapillo, distance nine and a half miles from our last night's encampment, in a tremendous shower of rain; the grass was indifferent, being clipped short by the cattle from the rancheria. Wood and water plenty.

At this place a Mr. Spry came into camp, on foot, and with scarcely any clothing. He had escaped from Santa Fé on the night previous, at Mr. H——'s request, to inform Colonel Kearny that Armijo's forces were assembling; that he might expect vigorous resistance, and that a place called the Cañon, 15 miles from Santa Fé, was being fortified; and to advise the Colonel to go round it.

The cañon is a narrow defile, easily defended, and of which we have heard a great deal. War now seems "inevitable;" and the advantages of ground and numbers will, no doubt, enable the Mexicans to make the fight interesting. The grass was miserable, and the camp ground inundated by the shower of to-day,—which was quite a rarity.

Barometric height 6,395 feet.

August 14.—The order of march to-day was that which could easily be converted into the order of battle. After proceeding a few miles we met a queer cavalcade, which we supposed at first to be the looked for alcalde from Moro town, but it proved to be a messenger from Armijo; a lieutenant, accompanied by a sergeant and two privates, of Mexican lancers. The men were good looking enough, and evidently dressed in their best bib and tucker. The creases in their pantaloons were quite distinct, but their horses were mean in the extreme, and the contempt with which our dragoons were filled was quite apparent. The messenger was the bearer of a letter from Armijo. It was a sensible, straightforward missive, and if written by an American or Englishman, would have meant this: "You have notified me that you intend to take possession of the country I govern. The people of the country have risen, en masse, in my defence. If you take the country, it will

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be because you prove the strongest in battle. I suggest to you to stop at the Sapillo, and I will march to the Vegas. We will meet and negotiate on the plains between them."

The artillery were detained some time in passing the Sapillo. This kept us exposed to the sun on the plains for four hours, but it gave the colonel time to reflect on the message with which he should dismiss the lancers; as there was some apprehension that Captain Cook was detained, their discharge became matter for reflection. Sixteen miles brought us in sight of the Vegas, a village on the stream of the same name.

A halt was made at this point, and the colonel called up the lieutenant and lancers and said to them, "The road to Santa Fé is now as free to you as to myself. Say to General Armijo, I shall soon meet him, and I hope it will be as friends."

At parting, the lieutenant embraced the colonel, Captain Turner, and myself, who happened to be standing near.

The country to-day was rolling, almost mountainous, and covered in places with scoriæ. Grass began to show itself, and was interspersed with malva pedata, lippia cunefolia, and several new species of geraniacæ, bartonia, and convolvulus. The soil was good enough apparently, but vegetation was stunted from the want of rain. As we emerged from the hills into the valley of the Vegas, our eyes were greeted for the first time with waving corn. The stream was flooded, and the little drains by which the fields were irrigated, full to the brim. The dry soil seemed to drink it in with the avidity of our thirsty horses. The village, at a short distance, looked like an extensive brick-kiln. On approaching, its outline presented a square with some arrangements for defence. Into this square the inhabitants are sometimes compelled to retreat, with all their stock, to avoid the attacks of the Eutaws and Navahoes, who pounce upon them and carry off their women, children, and cattle. Only a few days since, they made a descent on the town and carried off 120 sheep and other stock. As Captain Cook passed through the town some ten days' since, a murder had just been committed on these helpless people. Our camp extended for a mile down the valley; on one side was the stream, on the other the cornfields, with no fence or hedge interposing. What a tantalizing prospect for our hungry and jaded nags; the water was free, but a chain of sentinels was posted to protect the corn, and strict orders given that it should not be disturbed.

Captain Turner was sent to the village to inform the alcalde that the colonel wished to see him and the head men of the town. In a short time down came the alcalde and two captains of militia, with numerous servants, prancing and careering their little nags into camp.

Observations.—9 altitudes of polaris in the north, 7 of arcturus in the east, and 7 of alpha aquilæ in the east.

Latitude 35° 35′ 05″.

Longitude 7*h.* 00*m.* 46*s.*

Height, by the barometer, 6,418 feet.

August 15.—12 o'clock last night information was received that

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600 men had collected at the pass which debouches into the Vegas, two miles distant, and were to oppose our march. In the morning, orders were given to prepare to meet the enemy. At 7, the army moved, and just as we made the road leading through the town, Major Swords, of the quartermaster's department, Lieutenant Gilmer, of the engineers, and Captain Weightman joined us, from Fort Leavenworth, and presented Colonel Kearny with his commission as brigadier general in the army of the United States. They had heard we were to have a battle, and rode sixty miles during the night to be in it.

At eight, precisely, the general was in the public square, where he was met by the alcalde and people; many of whom were mounted, for these people seem to live on horseback.

The general pointed to the top of one of their houses, which are built of one story, and suggested to the alcalde that if he would go to that place he and his staff would follow, and from that point, where all could hear and see, he would speak to them; which he did, as follows:

"Mr. Alcalde and people of New Mexico: I have come amongst you by the orders of my government, to take possession of your country, and extend over it the laws of the United States. We consider it, and have done so for some time, a part of the territory of the United States. We come amongst you as friends—not as enemies; as protectors—not as conquerors. We come among you for your benefit—not for your injury.

"Henceforth I absolve you from all allegiance to the Mexican government, and from all obedience to General Armijo. He is no longer your governor; [great sensation.] I am your governor. I shall not expect you to take up arms and follow me, to fight your own people who may oppose me; but I now tell you, that those who remain peaceably at home, attending to their crops and their herds, shall be protected by me in their property, their persons, and their religion; and not a pepper, nor an onion, shall be disturbed or taken by my troops without pay, or by the consent of the owner. But listen! he who promises to be quiet, and is found in arms against me, I will hang.

"From the Mexican government you have never received protection. The Apaches and the Navajhoes come down from the mountains and carry off your sheep, and even your women, whenever they please. My government will correct all this. It will keep off the Indians, protect you in your persons and property; and, I repeat again, will protect you in your religion. I know you are all great Catholics; that some of your priests have told you all sorts of stories—that we should ill-treat your women, and brand them on the cheek as you do your mules on the hip. It is all false. My government respects your religion as much as the Protestant religion, and allows each man to worship his Creator as his heart tells him is best. Its laws protect the Catholic as well as the Protestant; the weak as well as the strong; the poor as well as the rich. I am not a Catholic myself—I was not brought up in that faith; but at least one-third of my army are Catholics, and I respect a good Catholic as much as a good Protestant.

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"There goes my army—you see but a small portion of it; there are many more behind—resistance is useless.

"Mr. alcalde, and you two captains of militia, the laws of my country require that all men who hold office under it shall take the oath of allegiance. I do not wish for the present, until affairs become more settled, to disturb your form of government. If you are prepared to take oaths of allegiance, I shall continue you in office and support your authority."

This was a bitter pill; but it was swallowed by the discontented captain, with downcast eyes. The general remarked to him, in hearing of all the people: "Captain, look me in the face while you repeat the oath of office." The hint was understood; the oath taken, and the alcalde and the two captains pronounced to be continued in office. The citizens were enjoined to obey the alcalde, &c. &c. The people grinned, and exchanged looks of satisfaction; but seemed not to have the boldness to express what they evidently felt—that their burdens, if not relieved, were at least shifted to some ungalled part of the body.

We descended by the same ricketty ladder by which we had climbed to the tops of the houses, mounted our horses, and rode briskly forward to encounter our 600 Mexicans in the gorge of the mountains, two miles distant.

The sun shone with dazzling brightness; the guidons and colors of each squadron, regiment, and battalion were for the first time unfurled. The drooping horses seemed to take courage from the gay array. The trumpeters sounded "to horse," with spirit, and the hills multiplied and re-echoed the call. All wore the aspect of a gala day; and, as we approached the gorge, where we expected to meet the enemy, we broke into a brisk trot, then into a full gallop, preceded by a squadron of horse. The gorge was passed, but no person seen.

One by one the guidons were furled; the men looked disappointed, and a few minutes found us dragging our slow lengths along with the usual indifference in regard to every subject except that of overcoming space.

Two miles further brought us to another pass as formidable as the first, and all the intermediate country was broken and covered with a dense growth of pine, piñon, and cedar. Here the mountains of red sand-stone, disposed in horizontal strata, begin to rise to the height of a thousand feet above the road. Nine miles more brought us to Tacoloté.

Here we met the alcalde and the people in the cool and spacious residence of the former, where the drama above described was again enacted. This time it was graced by the presence of the women with their bare ankles, round plump arms, and slippered feet.

We marched ten miles farther, to the Vernal springs, and halted at the upper spring, and observed for time and latitude about 500 feet south of the upper spring.

Observed 9 altitudes of polaris, 7 of alpha aquilæ, and 7 of arcturus. Latitude 35° 23′ 19″; longitude 7*h*. 01*m*. 23*s*.

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Height indicated by the barometer 6,299 feet.

August 16.—We marched to San Miguel, where General Kearny assembled the people and harangued them much in the same manner as at the Vegas.

Reports now reached us at every step that the people were rising, and that Armijo was collecting a formidable force to oppose our march at the celebrated pass of the Cañon, 15 miles from Santa Fé. About the middle of the day's march the two Pueblo Indians, previously sent in to sound the chief men of that formidable tribe, were seen in the distance, at full speed, with arms and legs both thumping into the sides of their mules at every stride. Something was now surely in the wind. The smaller and foremost of the two dashed up to the general, his face radiant with joy, and exclaimed, "they are in the Cañon, my brave, pluck up your courage and push them out." As soon as his extravagant delight at the prospect of a fight, and the pleasure of communicating the news, had subsided, he gave a pretty accurate idea of Armijo's force and position.

The road passed over to-day was good, but the face of the country exceedingly rugged, broken, and covered with piñon and cedar. To the left, one or two miles distant, towers a wall, nearly perpendicular, 2,000 feet high, apparently level on the top, and showing, as near as I could judge from the road, an immense stratum of red sand-stone.

We turned from the road to the creek, where there were a few rancherias, to encamp; at which place we passed an uncomfortable night, the water being hard to reach, and the grass very bad.

Barometric height 6,346 feet.

August 17.—The picket guard, stationed on the road, captured the son of Saliza, who, it is said, is to play an important part in the defence of this country, and the same who behaved so brutally to the Texan prisoners. The son was at San Miguel yesterday, and heard from a concealed place all that passed. It is supposed, at this time, he was examining the position, strength, &c., of our army, to report to his father.

A rumor has reached camp that the 2,000 Mexicans assembled in the Cañon to oppose us, have quarrelled among themselves; that Armijo, taking advantage of the dissensions, fled with his dragoons and artillery to the south. He has long been suspected of wishing an excuse to fly. It is well known he has been averse to a battle, but some of his people threatened his life if he refused to fight. He has been, for some days, more in fear of his own people than of the American army. He has seen what they are blind to: the hopelessness of resistance.

As we approached the ruins of the ancient town of Pecos, a large fat fellow, mounted on a mule, came towards us at full speed, and extending his hand to the general, congratulated him on the arrival of himself and army. He said, with a roar of laughter, Armijo and his troops have gone to hell, "and the Cañon is all clear." This was the alcalde of the settlement, two miles up the Pecos from the ruins, where we encamped, 15¾ miles from our last camp, and two miles from the road.

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Pecos, once a fortified town, is built on a promontory or rock, somewhat in the shape of a foot. Here burned, until within seven years, the eternal fires of Montezuma, and the remains of the architecture exhibit, in a prominent manner, the engraftment of the Catholic church upon the ancient religion of the country. At one end of the short spur forming the terminus of the promontory, are the remains of the estuffa, with all its parts distinct; at the other are the remains of the Catholic church, both showing the distinctive marks and emblems of the two religions. The fires from the estuffa burned and sent their incense through the same altars from which was preached the doctrine of Christ. Two religions so utterly different in theory, were here, as in all Mexico, blended in harmonious practice until about a century since, when the town was sacked by a band of Indians.

Amidst the havoc of plunder of the city, the faithful Indian managed to keep his fire burning in the estuffa; and it was continued till a few years since—the tribe became almost extinct. Their devotions rapidly diminished their numbers, until they became so few as to be unable to keep their immense estuffa (forty feet in diameter) replenished, when they abandoned the place and joined a tribe of the original race over the mountains, about sixty miles south. There, it is said, to this day they keep up their fire, which has never yet been extinguished. The labor, watchfulness, and exposure to heat consequent on this practice of their faith, is fast reducing this remnant of the Montezuma race; and a few years will, in all probability, see the last of this interesting people. The accompanying sketches will give a much more accurate representation of these ruins than any written descriptions. The remains of the modern church, with its crosses, its cells, its dark mysterious corners and niches, differ but little from those of the present day in New Mexico. The architecture of the Indian portion of the ruins presents peculiarities worthy of notice.

Both are constructed of the same materials: the walls of sun-dried brick, the rafters of well-hewn timber, which could never have been hewn by the miserable little axes now used by the Mexicans, which resemble, in shape and size, the wedges used by our farmers for splitting rails. The cornices and drops of the architrave in the modern church, are elaborately carved with a knife.

To-night we found excellent grass on the Rio Pecos, abreast of the ruins where the modern village of Pecos is situated, with a very inconsiderable population.

August 18.—We were this morning 29 miles from Santa Fé. Reliable information, from several sources, had reached camp yesterday and the day before, that dissensions had arisen in Armijo's camp, which had dispersed his army, and that he had fled to the south, carrying all his artillery and 100 dragoons with him. Not a hostile rifle or arrow was now between the army and Santa Fé, the capital of New Mexico, and the general determined to make the march in one day, and raise the United States flag over the palace before sundown. New horses or mules were ordered for the artillery, and every thing was braced up for a forced march. The

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RUINS OF PECOS – CATHOLIC CHURCH

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C. B. Graham Lith.

RUINS OF PECOS. AZTEC CHURCH.

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distance was not great, but the road bad, and the horses on their last legs.

A small detachment was sent forward at day-break, and at six the army followed. Four or five miles from old Pecos the road leads into a cañon, with hills on each side from 1,000 to 2,000 feet above the road, in all cases within cannon shot, and in many within point blank musket shot; and this continues to a point but 12 or 15 miles from Santa Fé.

The scenery is wild; the geological formation much the same as before described, until you begin to descend towards the Del Norte, when granitic rocks and sands are seen in great abundance on the road as far as Santa Fé. Cedar, piñon, and a large growth of long-leafed pine are densely crowded wherever the rock affords a crevice, until within six or eight miles of the town. Fifteen miles from Santa Fé we reached the position deserted by Armijo. The topographical sketch, by Lieutenant Peck, will give some idea of it. It is a gateway which, in the hands of a skilful engineer and one hundred resolute men, would have been perfectly impregnable.

Had the position been defended with any resolution, the general would have been obliged to turn it by a road which branches to the south, six miles from Pecos, by the way of Galisteo.

Armijo's arrangements for defence were very stupid. His abattis was placed behind the gorge some 100 yards, by which he evidently intended that the gorge should be passed before his fire was opened. This done, and his batteries would have been carried without difficulty.

Before reaching the cañon the noon halt was made in a valley covered with some gama, and the native potato in full bloom. The fruit was not quite as large as a wren's egg. As we approached the town, a few straggling Americans came out, all looking anxiously for the general, who, with his staff, was dressed so plainly, that they passed without recognizing us. Another officer and myself were sent down to explore the by-road by which Armijo fled. On our return to the main road, we saw two Mexicans; one the acting secretary of state, in search of the general. They had passed him without knowing him. When we pointed in the direction of the general, they broke into a full run; their hands and feet keeping time to the pace of their nags. We followed in a sharp trot; and, as we thought, at a respectable distance. Our astonishment was great to find, as they wound through the ravine, through the open well-grown pine forest, that they did not gain on us perceptibly. "Certainly they are in a full run, and as certainly are we only in a trot," we both exclaimed. I thought we were under some optical delusion, and turned to my servant to see the pace at which he was going. "Ah!" said he, "those Mexican horses make a mighty great doing to no purpose." That was a fact; with their large cruel bits, they harrass their horses into a motion which enables them to gallop very long without losing sight of the starting place.

The acting secretary brought a letter from Vigil, the lieutenant governor, informing the general of Armijo's flight, and of his readiness to receive him in Santa Fé, and extend to him the hopitalities

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of the city. He was quite a youth, and dressed in the fashion of the Americans. Here, all persons from the United States are called Americans, and the name is extended to no other race on the continent. To-day's march was very tedious and vexatious; wishing to enter Santa Fé in an imposing form, frequent halts were made to allow the artillery to come up. Their horses almost gave out, and during the day mule after mule was placed before the guns, until scarcely one of them was spared.

The head of the column arrived in sight of the town about three o'clock; it was six before the rear came up. Vigil and twenty or thirty of the people of the town received us at the palace and asked us to partake of some wine and brandy of domestic manufacture. It was from the Passo del Norte; we were too thirsty to judge of its merits, any thing liquid and cool was palatable. During the repast, and as the sun was sitting, the United States flag was hoisted over the palace, and a salute of thirteen guns fired from the artillery planted on the eminence overlooking the town.

The ceremony ended, we were invited to supper at Captain ——'s, a Mexican gentleman, formerly in the army. The supper was served very much after the manner of a French dinner, one dish succeeding another in endless variety. A bottle of good wine from the Passo del Norte, and a loaf of bread was placed at each plate. We had been since five in the morning without eating, and inexhaustible as were the dishes was our appetite.

August 19.—I received an order to make a reconnoissance of the town and select the site for a fort, in co-operation with Lieutenant Gilmer, of the engineers. This occupied me diligently on the 19th and 20th, and on the 21st the general was furnished with the map, a copy of which is sent to the Adjutant General and another to the Bureau of Topographical Engineers.

The site selected and marked on the map is within 600 yards of the heart of the town, and is from 60 to 100 feet above it. The contour of the ground is unfavorable for the trace of a regular work, but being the only point which commands the entire town, and which is itself commanded by no other, we did not hesitate to recommend it. The recommendation was approved. On the 22d we submitted a complete plan of the work, which was also approved. It is computed for a garrison of 280 men.

On the 23d, the work was commenced with a small force; on the 27th, 100 laborers were set to work on it, detailed from the army; and, on the 31st, 20 Mexican masons were added.

As it was determined to send an express to the States on the 25th, I commenced to project and plot my map of the route of the Army of the West, that the government might have at once the benefit of my labors. It was rather a bold undertaking to compress, in a few days, the work of months. My astronomical observations were brought up from day to day as we advanced on the march, without which the understanding would have been impracticable. We all worked day and night, and, with the assistance of several gentlemen of the volunteers, I succeeded in accomplishing the work; not, however, in a very satisfactory manner.

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Events now begin to crowd on each other in quick succession, but my duties keep me so constantly occupied in my office and in the field, that I cannot chronicle them in regular order or enter much upon details. On the morning of the 19th, the general assembled all the people in the plaza and addressed them at some length.

The next day, the chiefs and head men of the Pueblo Indians came to give in their adhesion and express their great satisfaction at our arrival. This large and formidable tribe are amongst the best and most peaceable citizens of New Mexico. They, early after the Spanish conquest, embraced the forms of religion, and the manners and customs of their then more civilized masters, the Spaniards. Their interview was long and interesting. They narrated, what is a tradition with them, that the white man would come from the far east and release them from the bonds and shackles which the Spaniards had imposed, not in the name, but in a worse form than slavery.

They and the numerous half-breeds are our fast friends now and forever. Three hundred years of oppression and injustice have failed to extinguish in this race the recollection that they were once the peaceable and inoffensive masters of the country.

A message was received the same night from Armijo, asking on what terms he would be received; but this proved to be only a ruse on his part to gain time in his flight to the south. Accounts go to show that his force at the Cañon was 4,000 men, tolerably armed, and six pieces of artillery. Had he been possessed of the slightest qualifications for a general, he might have given us infinite trouble. A priest arrived last night, the 29th, and brought the intelligence that at the moment of Armijo's flight, Ugarté, a colonel in the regular service, was on his march, at this side of the Passo del Norte, with 500 men to support him. That, had he continued, he would have been enabled to rouse the whole southern district, which is by far the wealthiest and most populous of the whole country.

In the course of the week, various deputations have come in from Taos, giving in their allegiance and asking protection from the Indians. That portion of the country seems the best disposed towards the United States. A Taos man may be distinguished at once by the cordiality of his salutation.*

A band of Navajoes, naked, thin, and savage looking fellows, dropped in and took up their quarters with Mr. Robideaux, our interpreter, just opposite my quarters. They ate, drank, and slept all the time, noticing nothing but a little cinnamon-colored naked brat that was playing in the court, which they gazed at with the eyes of gastronome's; and Mr. Fitzpatrick told me these people sometimes eat their own offspring, and consider it a great delicacy.

Various rumors have reached us from the south that troops are moving on Santa Fé, and that the people are rising, &c. To quiet

* Since this was written, the massacre of the excellent Governor Bent has taken place in Taos. It proves the profound duplicity of this race.

them, an expedition of 150 miles down the river has been determined on, to start on the 1st September.

August 30.—To-day we went to church in great state. The governor's seat, a large, well stuffed chair, covered with crimson, was occupied by the commanding officer. The church was crowded with an attentive audience of men and women, but not a word was uttered from the pulpit by the priest, who kept his back to tae congregation the whole time, repeating prayers and incantations. The band, the identical one used at the fandango, and strumming the same tunes, played without intermission. Except the governor's seat and one row of benches, there were no seats in the church. Each woman dropped on her knees on the bare floor as she entered, and only exchanged this position for a seat on the ground at long intervals, announced by the tinkle of a small bell.

The interior of the church was decorated with some fifty crosses, a great number of the most miserable paintings and wax figures, and looking glasses trimmed with pieces of tinsel.

The priest, a very grave, respectable looking person, of fair complexion, commenced the service by sprinkling holy water over the congregation; when abreast of any high official person he extended his silver water spout and gave him a handful.

When a favorite air was struck up, the young women, whom we recognised as having figured at the fandango, counted their beads, tossed their heads, and crossed themselves to the time of the music.

All appeared to have just left their work to come to church. There was no fine dressing nor personal display that will not be seen on week days. Indeed, on returning from church, we found all the stores open, and the market women selling their melons and plums as usual.

The fruits of this place, musk melon, apple, and plum, are very indifferent, and would scarcely be eaten in the States. I must except, in condemning their fruit, the apricot and grapes, which grow in perfection. On leaving the narrow valley of the Santa Fé, which varies from a thousand feet to a mile or two in width, the country presents nothing but barren hills, utterly incapable, both from soil and climate, of producing anything useful.

The valley is entirely cultivated by irrigation, and is *now*, as will be seen on the sketch, covered with corn. Five miles below the town, the stream disappears in the granitic sands.

The population of Santa Fé is from two to four thousand, and the inhabitants are, it is said, the poorest people of any town in the province. The houses are of mud bricks, in the Spanish style, generally of one story, and built on a square. The interior of the square is an open court, and the principal rooms open into it. They are forbidding in appearance from the outside, but nothing can exceed the comfort and convenience of the interior. The thick walls make them cool in summer and warm in winter.

The better class of people are provided with excellent beds, but the lower class sleep on untanned skins. The women here, as in many other parts of the world, appear to be much before the men in refinement, intelligence, and knowledge of the useful arts. The

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higher class dress like the American women, except, instead of the bonnet, they wear a scarf over the head. This they wear, asleep or awake, in the house or abroad.

The dress of the lower class of women is a simple petticoat, with arms and shoulders bare, except what may chance to be covered by the reboso.

The men who have means to do so, dress after our fashion; but by far the greater number, when they dress at all, wear leather breeches, tight round the hips and open from the knee down; shirt and blanket take the place of our coat and vest.

The city is dependant on the distant hills for wood, and at all hours of the day may be seen jackasses passing laden with wood, which is sold at two bits (twenty-five cents) the load. These are the most diminutive animals, and usually mounted from behind, after tne fashion of leap-frog. The jackass is the only animal that can be subsisted in this barren neighborhood without great expense; our horses are all sent to a distance of twelve, fifteen, and thirty miles for grass.

Grain was very high when we first entered the town, selling freely at five and six dollars the fanegas, (one hundred and forty pounds.) As our wagons draw near, and the crops of wheat are being gathered, the price is falling gradually to four dollars the fanegas.

Milk at six cents per pint, eggs three cents a piece, sugar thirty-five cents per pound, and coffee seventy-five cents. The sugar used in the country is principally made from the cornstalk.

A great reduction must take place now in the price of dry goods and groceries, twenty per cent. at least, for this was about the rate of duty charged by Armijo, which is now, of course, taken off.

He collected fifty or sixty thousand dollars annually, principally, indeed, entirely, on goods imported overland from the United States. His charge was $500 the wagon load, without regard to the contents of the wagon or value of the goods, and hence the duty was very unjust and unequal.

Mr. Alvarez informed me that the importations from the United States varied very much, but that he thought they would average about half a million of dollars yearly, and no more. Most of the wagons go on to Chihuahua without breaking their loads.

New Mexico contains, according to the last census, made a few years since, 100,000 inhabitants. It is divided into three departments—the northern, middle, and southeastern. These are again sub-divided into counties, and the counties into townships. The lower or southern division is incomparably the richest, containing 48,000 inhabitants, many of whom are wealthy and in possession of farms, stock, and gold dust.

New Mexico, although its soil is barren, and its resources limited, unless the gold mines should, as is probable, be more extensively developed hereafter, and the culture of the grape enlarged, is, from its position, in a commercial and military aspect, an all-important military possession for the United States. The road from Santa Fé to Fort Leavenworth presents few obstacles for a railway, and, if it

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continues as good to the Pacific, will be one of the routes to be considered, over which the United States will pass immense quantities of merchandise into what may become, in time, the rich and populous States of Sonora, Durango, and Southern California.

As a military position, it is important and necessary. The mountain fastnesses have long been the retreating places of the warlike parties of Indians and robbers, who sally out to intercept our caravans moving over the different lines of travel to the Pacific.

The latitude of Santa Fé, determined by 52 circum-meridian altitudes of alpha aquilæ, 23 of beta aquarii, and 36 altitudes of polaris out of the meridian, is N. 35° 44′ 06″. The longitude, by the measurement of 8 distances between the ∗ alpha aquilæ and the ☾, and 8 between ∗ antares and the ☾, is respectively 7*h*. 04*m*. 14*s*.7 and 7*h*. 04*m*. 22*s*.4. The mean of which is 7*h*. 04*m*. 18*s*. and the longitude brought by the chronometer from the meridian of Fort Leavenworth is 7*h*. 04*m*. 05*s*.5.—(See Appendix No. 4.)

The place of observation was the court near the northeast corner of the public square. The latitude may be considered fixed; but satisfactory as the longitude may appear, I should, nevertheless, have greatly multiplied the number of lunar distances, had I not been in daily expectation of receiving a transit instrument, with which a set of observations on moon culminating stars could have been made at this important geographical point.

The mean of all the barometric readings at Santa Fé indicates, as the height of this point above the sea, 6,846 feet, and the neighboring peaks to the north are many thousand feet higher.

August 31.—Lieutenant Warner arrived to-day, but cannot yet be relieved from ordnance duty. To-morrow an expedition goes to Taos, but, as Mr. Peck is sick, I have no officer to send with it. To-day apparently well authenticated accounts have arrived that Armijo met Ugarté, about 150 miles below, coming up with a force of 500 regulars and some pieces of artillery; that he turned back, and is now marching towards us with a large force, rallying the people as he passes, and that numbers are joining him from the upper towns. In consequence of these reports, the general has strengthened the force with which he is to march the day after to-morrow to meet him.

September 2.—We marched out of Santa Fé at 9 o'clock, a. m., taking no one of my party except Mr. Bestor, and leaving Lieutenant Peck, who is still an invalid, to assist Lieutenant Gilmer. We descended the valley of the Santa Fé river, nearly west, for five miles, when we left the river and struck across a dry arid plain intersected by arroyos, (dry beds of streams,) in a southwesterly course. Twenty-three miles brought us to the Galisteo creek, which, at that time, was barely running. The bed of the creek is sand and pebbles of the primitive rock, and lies between steep clay and lime-stone, traversed occasionally by trap dykes, which in one place are so regular as to resemble a wall pierced with windows. From this place to its mouth there is scarcely the sign of vegetation. At the dry mouth of the Galisteo, and directly on the Del Norte, is the town of Santo Domingo. Before reaching Galis-

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teo creek, but after leaving Santa Fé some miles, a few sprigs of grama tempted us to halt and bait our nags; but the principal growth on the plains was ephedra, Frémontia vermicularis, diotis lanata, (Romeria of the Spaniards,) hendecandia Texana. There was also picked up in to-day's journey a verbena pinnatifida, sphaeralcea stellata, a cleome integrifolia, (a handsome purple flowered herb,) several aster and a species of dicteria, which Dr. Torrey thinks new.

September 3.—This has been a great day. An invitation was received, some days since, from the Pueblo Indians to visit their town of Santo Domingo. From height to height, as we advanced, we saw horsemen disappearing at full speed. As we arrived abreast of the town we were shown by a guide, posted there for the purpose, the road to Santo Domingo. The chief part of the command and the wagon train were sent along the highway; the general with his staff and Captain Burgwyn's squadron of dragoons, wended his way along the bridle path nearly due west to the town. We had not proceeded far, before we met ten or fifteen sachemic looking old Indians, well mounted, and two of them carrying gold-headed canes with tassels, the emblems of office in New Mexico.

Salutations over, we jogged along, and, in the course of conversation, the alcalde, a grave and majestic old Indian, said, as if casually, "We shall meet some Indians presently, mounted and dressed for war, but they are the young men of my town, friends come to receive you, and I wish you to caution your men not to fire upon them when they ride towards them."

When within a few miles of the town, we saw a cloud of dust rapidly advancing, and soon the air was rent with a terrible yell, resembling the Florida war-whoop. The first object that caught my eye through the column of dust, was a fierce pair of buffalo horns, overlapped with long shaggy hair. As they approached, the sturdy form of a naked Indian revealed itself beneath the horns, with shield and lance, dashing at full speed, on a white horse, which, like his own body, was painted all the colors of the rainbow; and then, one by one, his followers came on, painted to the eyes, their own heads and their horses covered with all the strange equipments that the brute creation could afford in the way of horns, skulls, tails, feathers, and claws.

As they passed us, one rank on each side, they fired a volley under our horses' bellies from the right and from the left. Our well-trained dragoons sat motionless on their horses, which went along without pricking an ear or showing any sign of excitement.

Arrived in the rear, the Indians circled round, dropped into a walk on our flanks until their horses recovered breath, when off they went at full speed, passing to our front, and when there, the opposite files met, and each man selected his adversary and kept up a running fight, with muskets, lances, and bows and arrows. Sometimes a fellow would stoop almost to the earth to shoot under his horses' belly, at full speed, or to shield himself from an impending blow. So they continued to pass and repass us all the way to the steep cliff which overhangs the town. There they filed on each

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side of the road, which descends through a deep cañon, and halted on the peaks of the cliffs. Their motionless forms projected against the clear blue sky above, formed studies for an artist. In the cañon we were joined by the priest, a fat old white man. We were escorted first to the padre's, of course; for here, as every where, these men are the most intelligent, and the best to do in the world, and when the good people wish to put their best foot foremost, the padre's wines, beds, and couches have to suffer. The entrance to the portal was lined with the women of the village, all dressed alike, and ranged in treble files; they looked fat and stupid.

We were shown into his reverence's parlor, tapestried with curtains stamped with the likenesses of all the Presidents of the United States up to this time. The cushions were of spotless damask, and the couch covered with a white Navajoe blanket worked in richly colored flowers.

The air was redolent with the perfume of grapes and melons, and every crack of door and windows glistening with the bright eyes and arms of the women of the capilla. The old priest was busily talking in the corner, and little did he know the game of sighs and signs carried on between the young fellows and the fair inmates of his house. We had our gayest array of young men out to-day, and the women seemed to me to drop their usual subdued look and timid wave of the eye-lash for good hearty twinkles and signs of unaffected and cordial welcome—signs supplying the place of conversation, as neither party could speak the language of the other. This little exchange of the artillery of eyes was amusing enough, but I was very glad to see the padre move towards the table, and remove the pure white napkins from the grapes, melons, and wine. We were as thirsty as heat and dust could make us, and we relished the wine highly, whatever its quality. The sponge cake was irreproachable, and would have done honor to our best northern housekeepers. Indeed, wherever we have been feasted, the sponge cake has been in profusion, and of the best kind. After the repast, the general went forward on the portal and delivered a speech to the assembled people of the town, which was first interpreted into Spanish, and then into Pueblo.

It is impossible to arrive at the precise population of the town, but I should judge it to be about six hundred, and the quantity of ground under tillage for their support about five hundred acres.

The valley of the Del Norte is here quite narrow, and the soil sandy. The river itself was viewed by me, for the first time, with a strange interest. The hardships, trials, and perseverance of the gallant Pike, and the adventures of the pious and brave soldiers of the cross, Rivèra and La Ford, came forcibly to my mind; as I kneeled down to drink of its waters my thoughts were of them. Leaving Santo Domingo, we struck the highway in about four miles, and two more brought us to the pretty village of San Felippe, overhung by a steep craggy precipice, upon the summit of which are the ruins of a Roman Catholic church, presenting in the landscape sketch the appearance of the pictures we see of the castles on the Rhine.

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E. B. Graham's Lith.

SAN FELIPPE NEW MEXICO.

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Petween San Felippe and the Angosturas, six miles below, the valley of the river is very narrow, affording no interval for agriculture. On the west side, the banks are steep walls, crowned by seams of basalt forming the table lands. The east is composed of rolling sand hills, rising gradually to the base of the mountains, and covered with large round pebbles. I must except from this the poverty-stricken little town of Algodones, which has some ground round it in cultivation.

The observations for the determination of this camp, about one mile below the town of San Felippe, were made on my return, (September 10th,) and will be found under that date in Appendix No. 5. The height indicated by the barometer of this, the first camp on the Rio del Norte, is 5,000 feet above the level of the sea.

September 4.—Below the Angosturas, the valley of the river opens into a plain, varying from two to six miles in width, generally sufficiently low and level to admit the water of the river to be carried over it for the purposes of irrigation; but the soil is very sandy, and better adapted to Indian corn than wheat. Of this last we saw but few stubbles, the ground being chiefly planted with corn. The vegetation is much the same as that described after leaving Santa Fé, with the addition of quite a number of compositæ; among which was a species of linosyris, artemesia filifolia, aster, helicladus, &c.

News now began to arrive which left but little doubt that the reports which caused our movement down the river were exaggerated, if not wholly without foundation. People had passed down the river, as was reported, but in no great numbers. A messenger came in from the alcalde of Tomé with an official note, stating that Armijo had left with him one hundred mules, pressed into service to meet us at the cañon, and that Armijo had also notified him that one hundred more would be left at the Passo del Norte. These belonged to citizens of New Mexico, and had been taken from them without their consent. It was his practice, in peace or in war, to seize the person or property of any who fell under his displeasure.

The town of Bernallilo is small, but one of the best built in the territory. We were here invited to the house of a wealthy man, to take some refreshment. We were led into an oblong room, furnished like that of every Mexican in comfortable circumstances. A banquette runs around the room, leaving only a space for the couch. It is covered with cushions, carpets, and pillows; upon which the visiter sits or reclines. The dirt floor is usually covered a third or a half with common looking carpet. On the uncovered part is the table, freighted with grapes, sponge-cake, and the wine of the country. The walls are hung with miserable pictures of the saints, crosses innumerable, and Yankee mirrors without number. These last are suspended entirely out of reach; and if one wishes to shave or adjust his toilet, he must do so without the aid of a mirror, be there ever so many in the chamber.

We passed on to the house of our host's wealthy son, where we were invited to dine. Here we found another refreshment table;

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and, after waiting some hours, dinner was announced. It was a queer jumble of refinement and barbarism; the first predominating in every thing, except in the mode of serving, which was chiefly performed by the master, his Mexican guests, and a few female serfs.

The plates, forks, and spoons were of solid New Mexican silver, clumsily worked in the country. The middle of the table was strewed with the finest white bread, cut in pieces, and within the reach of every cover. At close intervals were glass decanters, of Pittsburg manufacture, filled with wine made on the plantation. The dishes were served separately. The first was soup maigre; then followed roast chicken, stuffed with onions; then mutton, boiled with onions; then followed various other dishes, all dressed with the everlasting onion; and the whole terminated by chilé, the glory of New Mexico, and then frigolé.

Chilé the Mexicans consider the chef-d'œuvre of the cuisine, and seem really to revel in it; but the first mouthful brought the tears trickling down my cheeks, very much to the amusement of the spectators with their leather-lined throats. It was red pepper, stuffed with minced meat.

From Bernallilo the valley opens, but narrows again at Zandia, an Indian town on a sand-bank at the base of a high mountain of the same name, said to contain the precious metals.

They were treading wheat here, which is done by making a circular corral on a level ground of clay; upon this floor they scatter the wheat, turn in a dozen or more mules, and one or two Indians, who, with whoops, yells, and blows, keep the affrighted brutes constantly in motion. To separate the wheat from the chaff, both Indians and Mexicans use a simple hand-barrow, with a bottom of raw bull's hide perforated with holes. I should suppose it must take an hour to winnow a bushel.

After dining sumptuously at Sandival's, we went to our camp in the Allemada. Here the valley is wide and well cultivated. The people of the surrounding country flocked in with grapes, melons, and eggs. Swarms of wild geese and sand cranes passed over camp. They frequent the river and are undisturbed, save when some American levels his rifle.

By observation, the latitude of this camp is 35° 11′ 50″, and the longitude 106° 45′ 00″ west of Greenwich.

September 6.—We encamped last night on very indifferent grass. Breakfasted with Don José Charvis, at Perdilla. When sitting, our chins just reached the table. There were five or six courses, ending with coffee. Before breakfast, we were summoned to mass in Don José's private chapel, where the eccentric person we met at yesterday's dinner officiated. Priest, fop, courtier, and poet were curiously combined in one person. Proud of his pure white hand, he flourished it incessantly, sometimes running his fingers through his hair, in imitation of some pretty coquette, and ever and anon glancing in one of the many looking-glasses with which the church was decorated. After mass, to our surprise, he delivered an elo-

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quent discourse, eulogising the grandeur, magnanimity, power, and justice of the United States.

Attending mass before breakfast proved anything but an appetizer. The church was crowded with women of all conditions, and the horrid reboso, which the poor use for shawls, bonnet, handkerchief, and spit-box, sent out an odor which the incense from the altar failed to stifle.

One fact struck me as singular in all the houses that we visited, the ladies never made their appearance; and it was always by the merest accident that we caught a glimpse of one of the family.

At Isoletta, I became tired of the show, and, seeing my servant talking at the door of one of his acquaintances, I took the liberty of asking permission to take a quiet siesta; but this was out of the question. The good woman overwhelmed me with a thousand questions about the United States, which could only be stopped by questioning her in return. She denounced Armijo; said, with a true Castilian flash of the eye, "I do not see how any man wearing those things," pointing to my shoulder straps, "could run away as he did. He had a good army to back him, and could have driven you all back."

The valley suddenly contracts below Perdilla, between Isoletta and Peralta. On the east side of the river there is deep sand, and the country is perfectly barren.

I observed to-night, for time and latitude at my camp, about 500 feet northwest of Senora Charvis's private chapel, thirteen altitudes of polaris give for the latitude of this place, 34° 50′ 57″; and twelve of corona borealis, and nine of alpha pegasi, give the chronometric longitude 7*h.* 07*m.* 8*s*.4.

September 7.—The early part of last evening was most beautifully bright and serene; the air was of the most delightful temperature, varied occasionally by a gentle breeze from the south, wafting along the perfume of the vineyards. I made some observations for time and latitude; the last unsatisfactorily, owing to the brightness of the moon dimming the southern stars. About 11 o'clock, the whole character of the night was changed by an east wind that came rustling down from the mountains, driving the sand before it. Nearly the whole distance travelled in the last three days has been over drifting sand, with only occasional patches of firm soil.

After rising early to attend to some business, I walked over the town of Peralta, which is interspersed with cotton wood, growing in nearly the regular order of an apple orchard. I then repaired to head-quarters, at the palace of Mr. Hortera, a spacions one story edifice, five hundred feet front.

We marched and encamped near Tomé. It was the eve of the fête of Tomé in honor of the Virgin Mary, and people from all parts of the country were flocking in crowds to the town. The primitive wagons of the country were used by the women as coaches. These wagons were heavy boxes mounted on wheels cut from large cotton wood; over the top of the box was spread a blanket, and inside were huddled, in a dense crowd, the women, children, pigs, lambs, and "every thing that is his." The man of the family

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usually seated himself on the tongue of the wagon, his time divided between belaboring his beasts and scratching his head. In one of these a violin was being played, and the women who were sitting on their feet, made the most of the music by brandishing their bare arms and moving their heads to the cadence. At night there was a theatrical representation in the public square. The piece dramatized was from the Old Testament.

During the day I had been puzzled by seeing at regular intervals on the wall surrounding the capilla, and on the turrets of the capilla itself, (which be it remembered is of mud,) piles of dry wood. The mystery was now to be cleared up. At a given signal all were lighted, and simultaneously a flight of rockets took place from every door and window of the chapel, fire-works of all kinds, from the blazing rocket to children's whirligigs, were now displayed in succession. The pyrotechny was the handicraft of the priests. I must say the whole affair did honor to the church, and displayed considerable chemical knowledge. Most of the spectators were on mules, each with his woman in front, and it was considered a great feat to explode a rocket under a mule's belly without previous intimation to the rider.

September 8.—Long shall I remember the fête of Tomé, a scene at once so novel and so striking. To-day, my duties called me off early in the morning.

I had to examine guides in reference to the route to California, and engage such as I might think fit for the trip.

My last interview of this kind to-day was in a species of public building, or guard-house, where a number of Mexicans had collected with arms. Several written tablets hung round the walls, but they were perfectly illegible. Our business was cut short by the sound of passing music. A strange sight presented itself. In a sedan chair, borne by four men, was seated a wax figure nearly as large as life, extravagantly dressed; following immediately were three or four priests, with long tallow candles, a full yard in length. Some American officers followed, each holding a candle. Unfortunately I emerged just as this group was passing; there was no escape, and the moment I joined a grave Mexican (apparently a man in authority,) thrust a candle into my hand. I thought of my coat, my only coat, the coat which was on my back, and which must take me to California, and back again into the interior of Mexico! Suddenly there was a halt without any word of command, and in the confusion we jostled against each other and distributed the tallow in great profusion.

It was thought proper that the officers should show every respect to the religious observances of the country, consequently they did not decline participation in these ceremonies.

The procession ended at the church. After the services there were concluded we repaired to the house of the padre, where we found a collation.

We had proposed attending a theatrical representation going on in the open air, but a heavy squall of wind and a few drops of rain put a stop to this amusement, and all retired to dress for the

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fandango, which is the name given to all collections of people where there is music and dancing.

A cotillion was attempted in honor of the Americans present, but this cold and formal dance soon gave way to the more joyous dances of the country, the Coona, the Bolero, and the Italiana. Every variety of figure was introduced, but the waltz was the basis of all, except the Bolero, which, as danced here, resembles our negro jig.

At the dance we found a very plain, but very intelligent woman, the sister of Armijo, who said he would return as soon as he settled his affairs in Chihuahua.

September 11.—Returned to Santa Fé.

September 15.—Sent Lieutenant Warner, with a party consisting of Lieutenant Peck and three men, to determine the latitude of Taos and the topography of the road.

From the 15th to 25th September I was busily engaged in fitting out for California.

Lieutenant Abert, who was left dangerously ill at Bent's Fort, had not arrived on the 25th, but accounts reached me that he was convalescent, and on his way to Santa Fé, where he might shortly be expected. Lieutenant Peck was also an invalid, and neither being able to accompany us to California, I left, by the general's direction, the subjoined order for them to make a map of New Mexico, based upon the astronomical points and measurements determined by myself, and to furnish from the best statistical sources, an account of the population and resources, military and civil, of the province.

Santa Fe, *September* 14, 1846.

Sir: I am charged by the general commanding to inform you that you will remain for the present in the territory of New Mexico, and should your health, or that of Lieutenant Peck, be sufficiently restored to return to duty, that you will continue the survey of this territory commenced by myself, and follow it to completion, provided it does not interfere with other military duties which may be required of you by the officer left in command of the territory.

With the limited number of instruments that can be placed in your hands, it is not expected that you will conduct the survey on strict geodetic principles, yet it is believed that sufficient precision can be attained to answer all the requirements of the military and civil service.

The country from Taos to Fra Cristobal contains nearly all the ground that is under cultivation, and nearly all that is worth cultivating; and for this whole distance it is open and bounded by high and conspicuous peaks, affording great facilities for conducting your operations.

I have established the astronomical positions of six points in this territory, viz: camp 42, at Vegas; camp 43, Vernal springs, Santa Fé; camp 55, 1¼ miles south of the church of San Felippe; camp

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49, at the Alameda; camp 51, at Peralta, at the mill, and I shall establish two more, one at Taos, and the other at Secoro.

These points are quite sufficient, and will be the base of your operations; and upon them you will form a trigonometric canevas. For this purpose the rule requiring every angle of the series to be greater than 30°, may be wholly disregarded. And after having determined by triangulation the position of any three conspicuous peaks, the position of any other points, which are in view of the three first named, may be determined by the problem of three points, as is practised in hydrographic surveys. Many such points will present themselves.

The canevas completed, the course of the Del Norte, that of its tributaries to the base of the mountains or beyond the settlements; the width of the valleys; the quantity of land under cultivation; the position of the towns, churches, hills, and all other topographical features of the country, can be determined with the Schmalkalde's compasses.

If your force is sufficient, the operation described in this last paragraph may be carried on simultaneously with the triangulation. You are aware that I have no theodolite at my disposal, the triangulation must, therefore, be made with the sextant.

The population, number of cattle, horses, and sheep, and the quantity of grain and other agricultural products, the facilities and best localities for water power to propel machinery, and also the mineral resources of the country, it is very desirable to know. You will, therefore, give particular attention to acquiring all the information on these subjects which the present statistical knowledge in the country will afford.

A requisition for five thousand dollars will be made on the Bureau of Topographical Engineers for the survey, to be placed to your credit with Mr. Robert Campbell of St. Louis, upon whom, I should think, you might safely draw, without waiting to hear from Washington.

I made a requisition on the bureau, dated June 18, 1846, for a transit instrument, and also for an instrument to obtain the magnetic dip and declination. Should these arrive, you will unpack them, mount the instruments near the place where I observed in Santa Fé, and commence a series of observations for longitude by moon culminating stars, and for the magnetic dip and declination.

The series for longitude will be continued for at least three lunations, and, should an opportunity present itself, I wish the observations and results to be communicated to me in California.

I am, very respectfully, your obedient servant,

W. H. EMORY,

First Lieut. Corps Top. Engineers.

Lieutenant J. W. Abert, or, in his absence,
Lieutenant W. G. Peck.

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General orders were issued designating the force to march on California. It consisted of three hundred United States 1st dragoons, under Major Sumner, who were to be followed by the battalion of Mormons, five hundred in number, commanded by Captain Cook.

Colonel Doniphan's regiment was to remain in New Mexico until relieved by Colonel Price's regiment, which was daily expected to reach there from the United States, when Colonel Doniphan's regiment was directed to effect a junction with General Wool at Chihuahua.

Major Clarke's two batteries of artillery were divided—one company, Captain Fisher's, to be left in New Mexico; the other, Captain Weightman's, to accompany Colonel Doniphan. The battalion of foot, under Captain Agney, was directed to remain in Santa Fé.

Thus was the army of the west divided into three columns, to operate in regions remote from each other, and never to unite again in one body.

September 25.—I received notice that the general was to march at 2, p. m., for California. His force consisted of three hundred dragoons, to be followed by a battalion of Mormons on foot that had not yet arrived in Santa Fé.

My requisition for twelve pack-saddles and eight mules not being filled, I determined to delay starting for an hour or two, and did not reach my camp, sixteen miles distant, till long after dark. I found my tent pitched, my supper smoking, and corn secured for my mules; this was gratifying, and I congratulated myself on the reorganization of my party, at least so far as the *personel* was concerned, for I had never found my camp so well attended to.

The day was excessively hot, the night very cold, the thermometer 32 degrees.

Memorandum.—My party is now organized as follows:

Lieutenant Warner, topographical engineers, &c.
J. M. Stanly, draughtsman.
Norman Bestor, assistant.

Men.

James Early, driver to instrument wagon;
W. H. Peterson, in charge of horizon box and cantina for sextants;
Baptiste Perrot, driver of transportation wagon;
Maurice Longdeau, in charge of spare mules;
François de Von Cœur, in charge of spare mules;
Frank Ménard, assistant teamster;
James Riley, assistant to Bestor;
Dabney Eustis, assistant to Stanly,
and the private servants of Lieutenant Warner and myself.

Our road is over the ground heretofore travelled and chronicled as far as Tomé.

As an evidence of the ignorance of the people here respecting

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the topography of the country, and also the ignorance of foreigners who have lived fifteen or twenty years in Santa Fé, no one could tell me where the Rio Santa Fé debouched into the Rio Grande.

I may here remark, that every night I furnished the distances travelled over to General Kearny at headquarters, and very often (whenever required) the latitude of the camp. In many cases these and the distances have been published; I shall, therefore, not repeat them. The latitudes in some cases have been incorrectly reported, and in others recomputed, and are therefore now given as final results.

September 26, 27, 28, 29, and 30.—We marched over the same ground already travelled over and described, between the 2d and 7th of September.

Below Zandia we were attracted by a great noise. It proceeded from a neighboring rancheria, where we saw eight or ten naked fellows hammering away in a trough full of cornstalks, as I had never seen Mexicans exert themselves before. The perspiration from their bodies was rolling off into the trough in profusion, and mingling with the crushed cane. This was then taken out, boiled, and transferred to a press, as primitive in construction as any thing from the hands of Father Abraham.

The hopper was the trunk of a scooped cotton wood tree, into this was inserted a billet of wood, upon which the lever rested about midway. Men, women, and children were mounted on each end; all see-sawing in the highest glee. I suggested, as an improvement, that one end of the lever be confined, and the whole of the living weight be transferred to the other end. "No! No!" said the head man, "if I do that, the fun of see-sawing will be over, and I can't get any body to work." The man was a disciple of Charles Fourier, and desired "to make labor attractive."

The morning of the 29th opened with a grand trade in mules and horses. A few days' experience was quite enough to warn us that our outfit would not answer, and the general directed that all the poor mules and horses should be exchanged for fat ones. The scene reminded one more of a horse market than a regular camp. The more liberal were our offers for the animals, the more exorbitant became the demands of the Mexicans.

At Albuquerque I was directed to call and see Madame Armijo, and ask her for the map of New Mexico, belonging to her husband, which she had in her possession. I found her ladyship sitting on an ottoman smoking, after the fashion of her countrywomen, within reach of a small silver vase filled with coal. She said she had searched for the map without success; if not in Santa Fé, her husband must have taken it with him to Chihuahua.

We crossed the Rio Grande del Norte at Albuquerque, its width was about twenty-five yards, and its deepest part just up to the hubs of the wheels. It is low at present, but at no time, we learned, is its rise excessive—scarcely exceeding one or two feet.

We encamped a little more than half way between Albuquerque and Pardillas, on a sandy plain, destitute of wood, and with little grass.

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A NEW MEXICAN INDIAN WOMAN.

C. B. Graham, Lith.

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We saw myriads of sand crane, geese, and brant.

September 30.—Feeling no desire to go over the same ground twice, I struck off on the table lands to the west, and found them a succession of rolling sand hills, with obione canescens, franseria acanthocarpa, yerba del sapa of the Mexicans, and occasionally, at very long intervals, with scrub cedar, about as high as the boot-top.

I saw here the hiding places of the Navajoes, who, when few in numbers, wait for the night to descend upon the valley and carry off the fruit, sheep, women, and children of the Mexicans. When in numbers, they come in day-time and levy their dues. Their retreats and caverns are at a distance to the west, in high and inaccessible mountains, where troops of the United States will find great difficulty in overtaking and subduing them, but where the Mexicans have never thought of penetrating. The Navajoes may be termed the lords of New Mexico. Few in number, disdaining the cultivation of the soil, and even the rearing of cattle, they draw all their supplies from the valley of the Del Norte.

As we marched down the river to meet Ugarté and Armijo, the Navajoes attacked the settlements three miles in our rear, killed one man, crippled another, and carried off a large supply of sheep and cattle. To-day we have a report, which appears well authenticated, that the Mexicans taking courage at the expectations of protection from the United States, had the temerity to resist a levy, and the consequence was, the loss of six men killed and two wounded.

They are prudent in their depredations, never taking so much from one man as to ruin him. Armijo never permitted the inhabitants to war upon these thieves. The power he had of letting these people loose on the New Mexicans was the great secret of his arbitrary sway over a people who hated and despised him. Any offender against Armijo was pretty sure to have a visit from the Navajoes.

I stopped at the little town of Isoletta, to visit my friend, the alcalde, who has the reputation, Indian though he be, of being the most honest man and best maker of brandy in the territory. Mr. Stanly accompanied me, for the purpose of sketching one of the women as a specimen of the race. I told the alcalde our object, and soon a very beautiful woman made her appearance, perfectly conscious of the purpose for which her presence was desired. Her first position was exquisitely graceful, but the light did not suit, and when Stanly changed her position, the charm of her attitude was gone.

We came down from the table lands through a ravine, where the lava, in a seam of about six feet, overlaid soft sand-stone. At the point of junction, the sand was but slightly colored. The lava was cellular, and the holes so large that the hawks were building nests in them.

At this ravine the Navajoes descended when they made their last attack; at the same moment the volunteers were ascending the other slope of the hill, on their way to garrison Cibolletta.

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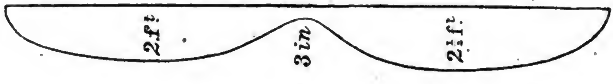
The camp of this date (September 30) is near the camp of September 6; and my observations this evening verified, in a very satisfactory manner, the travelling rate assumed for the chronometer 783. The longitude of camp of September 7, given by chronometer, is 7*h*. 07*m*. 00*s*.5; that of this present camp, which is one mile west of it, is 7*h*. 8*m*. 00*s*. Here, in addition to my usual observations for time and latitude, I took a set of lunar distances, with east and west stars.—(See Appendix.)

Above this camp, there is on the river a considerable growth of cotton-wood; among which are found some "signs" of beaver. The plains and river bottoms were covered with much the same growth as that heretofore noted; to which may be added an erythera, a handsome little gentian-like plant, with deep rose-colored flowers, and a solanum, a kind of wild potato, with narrow leaves, which Dr. Torrey says is different from any in the United States.

October 1.—To-day, for the first time for six days, I was able to rise from my bed without assistance. The air was elastic, and fragrant with the perfumes of the wild sage from the adjacent hills. Every thing was, in truth, couleur de rose; for the sun beamed out bright and red, infusing the same tint over the landscape, till near meridian. I crossed to Tomé, in search of some non-complying guides. We recrossed at Tomé, and measured the section of the river. Accordingly, we found the Rio Grande del Norte, many hundred miles from its source,

30 yards wide.



This section is about the same as at San Felippe and Santo Domingo. If to it we add the section of a stream of water carried off by two large zequias, each nine feet by two, we shall have an estimate of the volume of water discharged by this famous river, for 150 miles, through the most populous and fertile part of its valley.

Below Tomé, for a few miles, the valley widens, the soil improves, and the cultivation is superior to any other part, particularly that of the rancherias around the pleasant little village of Belen.

October 2.—This morning we passed the pretty church in the village of Sabinal, after which the settlements became very few and far between. We encamped opposite La Lloya, at the bend of the river Del Norte, where the low sand hills on either side seem to unite and shut up the valley.

We received a message from the major domo of the neighboring rancheria, cautioning us to we watchful of our animals, that forty of the Navajoes had passed the river last night. The incursions of these Indians have prevented the settlement and cultivation of this part of the country.

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C. B. Graham, Lith. Washington

VALENCIA, NEW MEXICO

UNIV. OF MICH.
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The sand bank, at the foot of which we are encamped, is filled with serpentine, harder than that which is dug in such quantities from the site of Fort Marcy, near Santa Fé.

Now and then we came to spots from which the waters were prevented from escaping by the sand, and had evaporated, leaving saline incrustations; about these we found growing abundantly atriplex and salicornia.

We found to-day lycium in great abundance, senecis longilobus, martynia proboscidea, (*cuckold's horns*,) and a small shrub with flower like convolvulus.

October 3.—The wagons from the rear not being up, we laid by all day, in hourly expectation of their arrival and an order to march. An express from Colonel Price came up, informing us of his arrival in Santa Fé.

About 12 o'clock in the day, a Mexican came into camp, with his horse foaming, to say that the Navajoes had made an attack on the town of Pulvidera. One company of dragoons was immediately despatched to the place, about twelve miles distant.

This camp was one of the prettiest of the whole march, on the curve of the river, fringed with large cottonwoods growing at intervals. The air was mild and balsamic, the moon shone brightly, and all was as still as death, except when a flock of geese or sand-cranes were disturbed in their repose. Several large cat fish and soft-shell turtle were caught, and we saw blue-winged ducks, plovers, doves, and a few meadow larks.

No fact proves the indolence and incapacity of the Mexican for sport or for war more glaringly, than that these immense flights of sand-cranes and geese are found quietly feeding within gunshot distance of their houses and largest towns. Going into Albuquerque, I started a hungry-looking wolf in a water melon patch, close under the walls of the town.

October 4.—The wagons mounted the sand hills with great difficulty. The river inpinges so close on the hills as to make it necessary, on the western side, to mount the table lands. These plains, reaching to the base of the mountains, are of the same character as heretofore mentioned, of rolling sand hills, covered with obione, canescens, prosopis glandulosa, (romeria,) riddellia tagetina, paga-paga —an abundant shrubby plant, belonging to the family of the amaranths, but a genus not yet described—a new dieteria, a new fallugia, baileya multiradiata, abronia mellifera, and a few patches of grama. This last is the only nutriment the plains afford for horses and cattle; but mules and asses, when hard pressed, will eat the trato and the romeria. The chamisa grows to a considerable height, and the stalk is sometimes two or three inches in diameter; a fire can be made of it sufficient to boil a kettle or roast an egg. To-day I eat, for the first time, the fruit of the prickly pear, the "yerba de la vivera," of the Mexicans; as I was thirsty, it tasted truly delicious, having the flavor of a lemon with crushed sugar.

Below La Joya two sand hill spurs, overlaid with fragments of lava and trap, project from the east and west, closing the valley, just leaving sufficient space for the river to pass between. The

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river winds below in a beautiful semicircle, bending to the west. On either side is excellent grass, apparently untouched, and shaded by large cottonwoods. To the west, the hills of Pulvidera form an amphitheatre. The whole picture, the loveliest I have seen in New Mexico, loses nothing by being projected, from where we stood, against the red walls of the Sierra Grande, which extend from Zandia southward, dividing the waters of the Puerco, of the east, from those of the Rio Grande.

I longed to cross these mountains and explore the haunts of the Apaches, and the hiding place of the Camanches, and look up a nearer route home by the way of the Red river, which the hunters and voyageurs all believe to exist. But onward for California was the word, and he who deviated from the trail of the army must expect a long journey for his jaded beast and several days' separation from his baggage. We were not on an exploring expedition; war was the object; yet we had now marched one thousand miles without fleshing a sabre.

Arrived at the town of Pulvidera, which we found, as its name implies, covered with dust, we received full accounts of the attack made on the town by the Apaches the day before. The dragoons arrived too late to render assistance.

About one hundred Indians, well mounted, charged upon the town and drove off all the horses and cattle of the place. The terrified inhabitants fled to their mud houses, which they barricaded. The people of Lamitas, a town two miles below, came to the rescue, and seized upon the pass between the Sierra Pulvidera and the Sierra Secoro. The Indians seeing their retreat with the cattle and goats cut off, fell to work like savages as they were, killing as many of these as they could, and scampered off over the mountains and cliffs with the horses and mules, which they could more easily secure.

This same band entered the settlements some miles above when we were marching on Santa Fé, and when Armijo had called all the men of the country to its defence. In this foray, besides horses, they carried off fifteen or sixteen of the prettiest women.

Women, when captured, are taken as wives by those who capture them, but they are treated by the Indian wives of the capturers as slaves, and made to carry wood and water; if they chance to be pretty, or receive too much attention from their lords and masters, they are, in the absence of the latter, unmercifully beaten and otherwise maltreated. The most unfortunate thing which can befal a captive woman is to be claimed by two persons. In this case, she is either shot or delivered up for indiscriminate violence.

These banditti will not long revel in scenes of plunder and violence. Yesterday Colonel Doniphan's regiment was directed to march into their country and destroy it. One of their principal settlements, and farming establishments, is said to be nearly due west from here, about two days' march; the road leading through the formidable pass above noted.

Yesterday and to-day we came across some unoccupied strips of ground. Their number yesterday was greater than to-day; for, since we passed Pulvidera, the sand hills encroach on the river and

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leave the valley scarcely a mile wide. The cottonwood, however, is getting more plentiful, and we have not been obliged to use the "bors de vache" in cooking for some days.

To-night I measured two sets, or 18 lunar distances, east and west ☾, 12 altitudes of polaris, 10 of andromedæ, and 8 of alpha lyræ.

The resulting latitude 34° 07′ 39″.

Longitude 7*h*. 07*m*. 54*s*.

October 5.—*Camp near Secoro.*—Last night a Mexican came into camp, and said we should now leave the river and strike for the Gila, nearly due west. He was one of the men engaged by me as guide while on the first trip to Tomé. We accordingly moved only six miles to-day, and encamped a little north of Secoro, preparatory to taking the hills to-morrow. The prospect is forbidding; from the Sierra Lescadron, opposite the amphitheatre, as far south as the eye can reach on the western side of the river, is a chain of precipitous basaltic mountains, traversed by dykes of trap. Through these we are to pass.

I rode to the base of the Sierra Secoro, overhanging the town of that name, and about three miles distant from the river. It is a confused mass of volcanic rocks, traversed by walls of a reddish colored basalt and seams of porphyritic lava and metamorphic sand stone. In one or two places, where the water had washed away the soil near the base, I found specimens of galena and copper ore very pure; but of the extent of these beds I can form no opinion, nor can I say positively they were not erratic. The ore in this mountain is said at one time to have been worked for gold, but the difficulty of getting quicksilver induced the operator to move to a mine on the opposite side of the river, near Manzanas, where, it is said, quicksilver is to be found; but the specimens from that place, of what the inhabitants exhibited as rock containing quicksilver, on analysis, was found to contain none. Should the command halt to-morrow to prepare for the mountains, I shall be enabled to give the place a more thorough examination.

To the east, close to the banks of the river, still runs the Sierra Grande, which commences at Zändia with such towering heights, but here tapers down to moderate sized hills. The formation is apparently of different colored sand stone, and wherever the stratification shows itself, dipping about 25 degrees to the south and east; but in some places it is horizontal, and in others showing great disturbance. With the glass may be seen walls of light-colored stone, basalt or trap, running off for miles in a straight line nearly north and south. The town of Secoro, containing about one hundred inhabitants, is prettily situated in the valley of the river which is here almost circular, and about three or five miles in diameter. The church, as usual, forms the salient point, which meets the eye at a great distance.

The growth on the sand plains to-day was chiefly iodeodonda*

* Since writing the above, the following extract of a note from Dr. Torrey was received in reference to this plant, which is so remarkable, and extends over so great a surface.

"The *iodeodonda* I find described in a late work by Moricand, entitled '*Plantes nouvelles ou rares d'Amerique.*' It is described by him as a new genus, under the name larrea. It is well figured in his 48th plate as *Larrea Mexicana*. In its affinities it is allied to *guiacum*."

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and a little stunted acacia. The iodeodonda is a new plant, very offensive to the smell, and, when crushed, resembling kreosote. Its usual growth is the height of a man on horseback, and is the only bush which mules will not eat when excessively hungry; besides this were varieties of ephedra, erytherœa, helianthus petiolaris, and two well known and widely diffused grasses, the reed grass, and a short salty grass, uniola distichophylla.

October 6.—It was determined to follow the river still farther down before turning west. Great difficulty was experienced in getting teams to assist us. The Mexicans we had engaged, as if by universal agreement, refused to go farther, alleging fear of the Apaches; but the truth was they expected to extort money. In Armijo's day, when a thing was wanted for government, it was taken. Our treatment turned their heads, and, like liberated slaves, there was no limit to their expectations and exactions. We used every means to bring these people to reason, but finding them intractable, and that the progress of the army was arrested, the quartermaster, Major Swords, seized what wagons and animals were needed, and paid a liberal price for them. To our surprise they were perfectly enchanted at the whole business; first at being paid at all, but principally at being relieved from the responsibility of deciding for themselves what they would take for the chattels. A likely boy who had been engaged to go to California as arriero, was to-day claimed by his creditor or master. He owed the man sixty dollars, and was by the law of the country paying this debt by serving at two dollars per month; out of this he was to feed and clothe himself, his master being sutler. It was plain he could not pay his debt in his lifetime. When such debtors get old and unfit for labor, it is the custom to manumit them with great pomp and ceremony. This makes the beggars of the country. The poor debtors thus enthralled for life for a debt of sixty dollars are called peons, and constitute, as a class, the cheapest laborers in the world. The price of the labor for life of a man was, in the case we have stated, sixty dollars, without any expense of rearing and maintenance in infancy or old age, the wages covering only a sum barely sufficient for the most scanty supply of food and clothing.

I saw some objects perched on the hills to the west, which were at first mistaken for large cedars, but dwindled by distance to a shrub. Chaboneau (one of our guides) exclaimed "Indians! There are the Apaches." His more practised eye detected human figures in my shrubbery. They came in and held a council, swore eternal friendship, as usual, no doubt with the mental reservation to rob the first American or Mexican they should meet unprotected.

The women of this tribe rode à la Duchesse de Berri, and one of them had an infant, about two months old, swung in a wicker basket at her back. Their features were flat, and much more negro-like than those of our frontier Indians; a few Delawares in camp presented a strong contrast, in personal appearance and intelligence, with the smirking, deceitful looking Apache. Some of them had fire arms, but the greater part were armed with lance and bow. They were generally small legged, big bellied, and broad shouldered.

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Came into camp late, and found Carson with an express from California, bearing intelligence that that country had surrendered without a blow, and that the American flag floated in every port.

October 7.—*Camp* 68.—Two Mexicans deserted from my party last night, frightened by the accounts of the hardships of the trip brought by Carson and his party. Yesterday's news caused some changes in our camp; one hundred dragoons, officered by Captain Moore and Lieutenants Hammond and Davidson, with General Kearny's personal staff, Major Swords, Captain Johnson, Captain Turner, adjutant general to the army of the west, Messrs. Carson and Robideaux, my own party, organized as before mentioned, and a few hunters of tried experience, formed the party for California. Major Sumner, with the dragoons, was ordered to retrace his steps. Many friends here parted that were never to meet again, some fell in California, some in New Mexico, and some at Cerro Gordo.

Arrived in camp late, after a most fatiguing day, watching and directing the road for my overloaded and badly horsed wagon. I sat up until very late, making astronomical observations.

About two miles below the camp of last night, we passed the last settlement, and in about four miles left the beaten road, which crosses the east side of the river, and thenceforth a new road was to be explored. The land passed over to-day, although unsettled, is incomparably the best in New Mexico; the valley is broader, the soil firmer, and the growth of timber, along the river, larger and more dense.

The ruins of one or two deserted modern towns, probably Valverde, and remains of ditching, for irrigation, were passed to-day. The frequent incursions of the Indians are said to cause the desertion of this part of the valley.

As we approached our camp, the lofty range of mountains sweeping to the northwest, around the head of the Gila, became unmasked, at the same moment that the Puerco range showed themselves on the eastern side of the river Del Norte, stretching boldly and far away to the south. This last ridge of mountains is to the east, and altogether distinct from that commencing at Zandia, and tapering off to the south close to the river.

I have heretofore revelled in the perfect stillness and quietude of the air and scenery of New Mexico; yesterday and to-day have been exceptions, for the wind has been very high from the south, and the dust overwhelming.

Computed to-day the height of the Secoro mountain to be 2,700 feet above the level of the plain. Several officers guessed at the height of the mountain, and the mean of all the guesses was 1,200 feet, and the distance of the peak only two and a half miles, while it was, in fact, upwards of four miles. He who attempts to reckon the height and distance of hills in this pure, dry atmosphere, after coming from ours, will always fall as much short of the mark.*

One or two large white cedars were seen to-day, and, in addition

* Attention is asked to my meteorological record in the Appendix. A wonderful difference between the thermometer and wet bulb will there be seen, showing the dryness of the atmosphere.

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to the usual plants, was that rare one cevallia sinuata, gauva parviflora, œnothera sinuata, and a species of wild liquorice, but with a root not sweet, like the European kind.

The latitude of this camp by 10 altitudes of polaris, 33° 41′ 19″.

Longitude of this camp, 18 observations, east and west stars, 7*h*. 08*m*. 57*s*.

October 8.—*Camp* 69.—The valley of the Del Norte, as we advance, loses what little capacity for agriculture it possessed. The river commences to gather its feeble force into the smallest compass to work its way around the western base of Fra Cristobal mountain. The Chihuahua road runs on the eastern side, and that part of it is the dreaded jornado of the traders, where they must go most seasons of the year ninety miles without water.

Our road over hill and dale led us through a great variety of vegetation, all totally different from that of the United States. To-day's observations of the plants may be taken as a fair specimen of the southern part of New Mexico. First, there were cacti in endless variety and of gigantic size, our new and disagreeable friend, the larrea Mexicana, Fremontia vermicularis, obione canescens, tessaria borealis, diotis lanata, franseria acanthocarpa, several varieties of mezquite, and among the plants peculiar to the ground passed over, were several compositæ, a species of malva convolvulus, an unknown shrub found in the beds of all deserted rivers; larger grama, as food for horses, nearly equal to oats, and dalea formosa, a much branced shrub, three feet high, with beatiful purple flowers. The infinite variety of cacti could not be brought home for analysis, and this department of the Flora must be left to the enterprise of some traveller, with greater means of transportation than we possessed. A great many were sketched, but not with sufficient precision to classify them.

The table lands, reaching to the base of the mountains to the west, are of sand and large, round pebbles, terminating in steep hills from a quarter to a half mile from the river, capped with seams of basalt. Some curious specimens of soft sand stone were seen to day, of all shapes and forms, from a batch of rolls to a boned turkey.

October 9.—The country becomes broken, and the valley narrows into a cañon which sweeps at the base of Fra Cristobal mountain, making it necessary to rise to the table lands on the west side, which we found traversed by deep arroyos, crowned on their summits by basalt, underlayed by sand stone.

I shot two or three quails, (*ortix squamosa?*) differing from ours in their plumage, but entirely similar to them in their habits. We also killed a hawk resembling, in all respects, our sparrow-hawk, except in the plumage, which, like the quail, was that of the landscape, lead colored.

Game in New Mexico is almost extinct, if it ever existed to any extent. To-day we saw a few black tailed rabbits, and last night Stanly killed a common Virginia deer.

Three distinct ranges of mountains, on the west side of the river, are in view to-day, running apparently northwest, and nearly parallel to each other. The lesser range commences at Secoro; the

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next at Fra Cristobal mountain, and the last at a point farther west, yet to be determined. The ravines between are broad, and show the beds of dry streams, which would probably be found watered when near their sources. A butte was seen in the distance, close to the river, and surrounded by trees, which was at first taken for an adobe house, but the near approach showed it a conglomerate cemented by lime, which had been left standing when the surrounding earths were washed away. At its base I found some rare specimens of olivine set in lava. The road was unbroken, obstructed by bushes, and so bad that the wagons made only 11½ miles, and the teams came into camp "*blown*" and staggering after their day's work. Expecting nothing better ahead, it was determined to leave the wagons and send back for pack-saddles. My own pack-saddles having been brought along, I had time to observe the rates of my chronometers and make other preparations necessary for so important a change in our mode of proceeding.

October 10th, 11th, and 12th were passed in camp waiting for the pack-saddles.

We are now 203 miles from Santa Fé, measured along the river; 16 circum-meridian altitudes of beta aquarii, and 17 altitudes of polaris give me for the latitude of the place 33° 20′ 02″, and the longitude, by the chronometer, 7h. 08m. 57s. We must soon leave the river. A cross section of it at this point is 118 feet wide, with a mean depth of 14 inches, flowing over large round pebbles, making it, at this point, unsuitable fo navigation with any kind of boats.

The height of our first camp on the Del Norte, one mile north of San Felippe, indicated by the barometer, was 5,000 feet, showing we had descended, from Santa Fé, 1,800 feet.

Here the height is 4,241 feet, showing an average fall in the Del Norte, from the camp near San Felippe to this place, of four feet and a half per mile. The greater part of the way the fall is uniform and unobstructed by rapids, and the river flows, for the most part, over a bed of sand, without any sensible increase or diminution in its volume of water. Sometimes its tranquil course is rippled by large angular fragments of basalt, trapp, lava, and amygdaloid, which everywhere strew the table lands of New Mexico.

Our present camp is in a valley 70 or 100 acres in extent, well grassed and wooded, and apparently untrodden by the foot of man; for here we saw, for the first time in New Mexico, any considerable "signs" of game in the tracks of the bear, the deer, and the beaver. We flushed several bevies of the blue quail, saw a flock of wild geese, summer duck, the avocet, and crows.

Above and below us is a cañon, and on the eastern side of the river the Fra Cristobal shoots up to a great height. We saw on its sides, reaching nearly to the top, large black objects which we could not distinguish with our indifferent glasses, but which must be either shrubbery or rocks.

For the last night or two it has been unusually cold, the thermometer ranging from 25° to 32° Fahrenheit, but during the day it mounts up to 75° and 80°.

October 13.—Moved one mile to get better grass. Just as we

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had pitched our new camp Lieutenant Ingalls came up with a mail, and gave the pleasant information that the saddles were only about six hours behind.

October 14.—We parted with our wagons, which were sent back under charge of Lieutenant Ingalls, and, in doing so, every man seemed to be greatly relieved. With me it was far otherwise. My chronometers and barometer, which before rode so safely, were now in constant danger. The trip of a mule might destroy the whole. The chronometers, too, were of the largest size, unsuited to carry time on foot or horseback. All my endeavors, in the 24 hours allowed me in Washington to procure a pocket chronometer, had failed. I saw then, what I now feel, the superiority of pocket over large chronometers for expeditions on foot or horseback. The viameter for measuring distances, heretofore attached to the wheel of the instrument wagon, was now attached to the wheel of one of the small mountain howitzers.

The valley narrows into a cañon at Bush peak, and opens again a mile or so wide, where we encamped for the night. Growth of to-day much the same as yesterday.

Bush peak is, on its river face, a steep escarpment of basalt, and abreast of it, on the west side of the river, we saw many chips of metalliferous limestone. To-day, met a solitary Mexican mounted on a mule, driving before him a horse, with his back literally skinned with the saddle. He was beating the poor beast over the galled place. The Mexicans generally treat their horses and mules in a barbarous manner, riding and packing them when their backs are running with sores.

October 15.—After travelling three and a half miles, we turned off from the Del Norte and took final leave of it at a pretty little grove, where we found two Mexicans returning from a trading expedition to the Apaches. They were attending a poor worn out jennet, (that had been maltreated and overtasked,) in the hope that a few days' rest would enable it to take their lazy bodies to the settlements.

At this point, several intelligent guides were detached to look up a road further south, by which Captain Cook, who is to follow us with the Mormons, may turn the mountains with his wagons.*

After mounting to the table land, some 200 feet above the valley, it is very level, except where the table land is indented by the streams from the mountains, most of which are now dry. We passed two in succession, both deep and wide enough to contain all the water of the Mississippi, and presenting the appearance of the deserted beds of once large and turbulent rivers. The beds were paved with large round pebbles, mostly of the red feldspathic granite.

On the table land the winter grama (a more delicate grass than summer grama) was in great abundance, but now dry and sun burnt. The other growth noticed to-day consisted of malva, senecio longilobus, small mezquite, fraxinus, (ash,) different from any in the United States; castilleja and datura.

* The route followed by Colonel Cooke will be found traced on the map

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Far off to the south, between the peaks of two high mountains, stretched the table land contiguous to the valley of the Del Norte. For the first time since leaving the Arkansas the mirage was seen, and gave the wide opening the appearance of a sheet of water disturbed by the wind. Two distant peaks looming up looked, for all the world, like a fore and-aft-schooner. As I was observing this my mule came to a halt at the edge of a steep precipice. Below were green trees and luxuriant foliage, the sure indication of water. The stream was clear, limpid, and cool, the first, but one, I had seen since crossing the Alleghanies, where water could be drunk without imbibing a due proportion of mud and sand. Its name, Paloma, (Pigeon creek.)

In the valley grows cotton wood, a new variety of evergreen oak, with leaves like the holly, a new variety of ash, and a new kind of black walnut, with fruit about half the size of ours. The oak was covered with round red balls, the size and color of apricots—the effects of disease or the sting of an insect.

Four miles further brought us to another creek of clear water, running sluggishly, and like the last the size of a man's waist. In its valley were many large trees, uprooted, presenting the appearance of new ground.

On the plains and in the dry valleys were many rare specimens of chalcedony. The only living thing seen was a small rattlesnake, the first since we left Vegas, of the size and mark of the small prairie snake, but of reddish hue, like that of the ground it inhabited.

Observed to-night for latitude and longitude; our height was (approximately) 4,810 feet above the sea.

October 16.—We commenced the approach to the Mimbres mountains over a beautiful rolling country, traversed by small streams of pure water, fringed with a stunted growth of walnut, live oak and ash. The soil in the valleys and to the hill tops of the best quality, covered with a luxuriant growth of grama, a species of entriana differing from the large grama. Nothing but rain is required to make this part of the country inhabitable. There were several new and beautiful varieties of cactus and the entamario (tessaica borealis) diotis lanata in great luxuriance; one a miniature tree, with the stalk six inches in diameter, a new species of dieteria like an aster, with fine purple flowers; aster hebecladus and three-leaved barberry (berberis trifoliolata.)

This must one day become a great grazing country, particularly for sheep. The pure dry air is eminently adapted to them, and they are said to be in all New Mexico very prolific, an ewe seldom failing to drop two lambs.

October 17.—We ascended from the stream, on which we were encamped, by a narrow valley for 2½ hours before reaching the summit between it and the Mimbres, which was so indistinct that I passed it several miles before discovering it. We descended in an arroyo towards the Rio Mimbres, very narrow, and full of shattered pitch stone; the sides and bank covered with a thick growth of stunted live oak. In full view, nearly the whole time of our de-

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scent, was a mountain of peculiar symmetry, resembling the segment of a spheroid. I named it "the Dome". Our road led along its base to the north; another path leading to Janos, a frontier town in Sonora, passes down the Mimbres on the south side. The Mimbres was traversed only a mile; for that distance its valley was truly beautiful, about one mile wide of rich fertile soil, densely covered with cotton wood, walnut, ash, &c. It it is a rapid, dashing stream, about fifteen feet wide and three deep, affording sufficient water to irrigate its beautiful valley. It is filled with trout. At this place we found numberless Indian lodges, which had the appearance of not having been occupied for some time. We turned westward and ascended all the way to our camp.

The mountains appeared to be formed chiefly of a reddish amygdaloid and a brown altered sandstone, with chaledonic coating. In places, immense piles of conglomerate protruded; disposed in regular strata, dipping to the south at an angle of 45°. There was also one pile of volcanic glass brittle, in strata about a half an inch thick, dipping 45° to the south. The character of the country and its growth to-day are very similar to those of yesterday; several new plants and shrubs, amongst which was the cercocarpus parvifolius, a curious rosaceous shrub, "with a spiral, feathery tail, projecting from each calyx when the plant is in seed." The spiral tailed or barbed seed-vessels fall when ripe, and, impelled by the wind, work into the ground by a gyratory motion. The cedar seen to-day was also very peculiar; in leaf resembling the common cedar of the States, but the body like the pine, except that its bark was much rougher. (For the rest of to-day's growth, see catalogue of plants for this date.)

At night, 12 circum-meridian altitudes of beta aquarii, and seven altitudes of Polaris, give for the latitude of the camp 42° 11′.

October 18.—A succession of hills and valleys covered with cedar, live oak and some long leafed pine. We passed at the foot of a formidable bluff of trapp, running northwest and southeast, which I named Ben Moore, after my personal friend, the gallant Captain Moore, of the 1st dragoons. In many places the path was strewed with huge fragments of this hard rock, making it difficult for the mules to get along. Turning the north end of Ben Moore bluff, we began to drop into the valley of what is supposed an arm of the Mimbres, where there are some deserted copper mines. They are said to be very rich, both in copper and gold, and the specimens obtained sustain this assertion. We learned that those who worked them made their fortunes; but the Apaches did not like their proximity, and one day turned out and destroyed the mining town, driving off the inhabitants. There are the remains of some twenty or thirty adobe houses, and ten or fifteen shafts sinking into the earth. The entire surface of the hill into which they are sunk is covered with iron pyrites and the red oxide of copper.

Many veins of native copper were found, but the principal ore is the sulphuret. One or two specimens of ammoniate of silver were also obtained.

Mr. McKnight, one of the earliest adventurers in New Mexico,

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VALLEY OF THE MIMBRES

UNIV. OF MICH.

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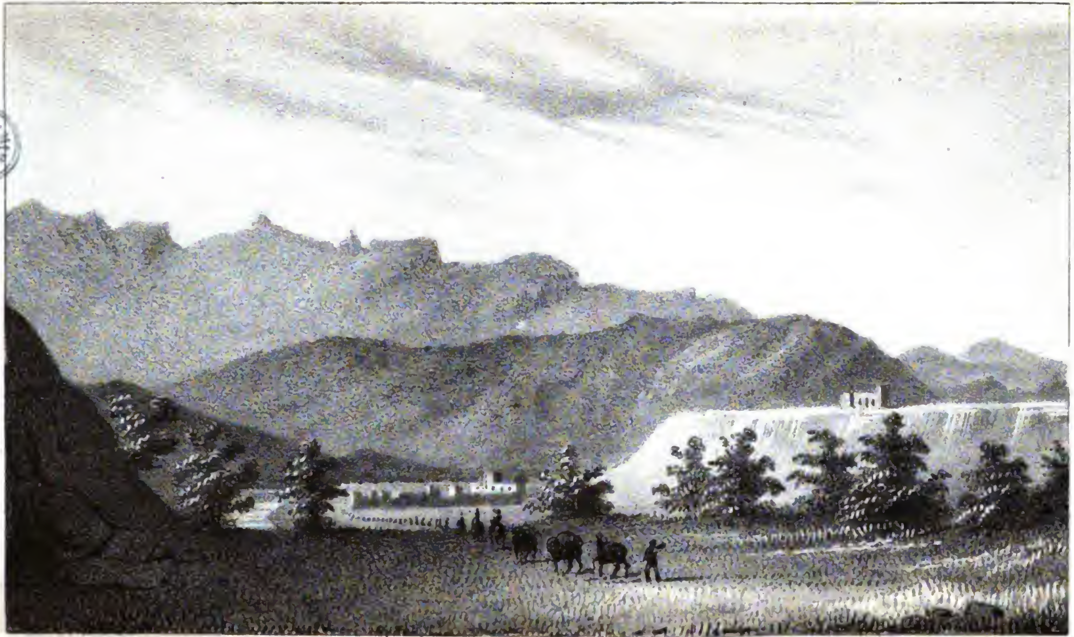

C. B. Graham, Lith.

VIEW OF THE COPPER MINE

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was the principal operator in these mines, and is said to have amassed an immense fortune. On his first arrival in the country he was suspected to be an agent of the United States, and thrown into prison in Sonora, where he was kept in irons for eleven years. He is said to have stated that the gold found in the ore of these mines paid all the expenses of mining, and the transportation of the ore to the city of Mexico, where it was reduced.

We were disappointed in not meeting the Apaches yesterday and to-day. This afternoon three men came in dressed very much like the Mexicans, mounted on horses. They held a talk, but I do not know the purport. This afternoon I found the famous mezcal, (an agave,) about three feet in diameter, broad leaves, armed with teeth like a shark; the leaves arranged in concentric circles, and terminating in the middle of the plant in a perfect cone. Of this the Apaches make molasses, and cook it with horse meat.

We also found to-day the dasylirion graminifolium, a plant with a long, narrow leaf, with sharp teeth on the margin, with a stalk eighteen feet high. According to Doctor Torrey, it has lately been "described by Zuccarini," who says "four species of this genus are now known, all of them Mexican or Texan."

The elevation of this camp was 6,167 feet.

October 19.—I tried last night to get observations for latitude, &c.; but the early part was cloudy, and we fell asleep and did not wake till broad daylight. In the afternoon there was a thunder-storm to the west, which swept around towards the north, where it thundered and lightened till nearly 9 o'clock. The country passed over in the first part of to-day was beautiful in the extreme; a succession of high, rolling hills, with mountains in the distance. The soil rich, and waving with grama. The latter part was more barren, and covered with artemisias.

The spring of San Lucia, 13½ miles from the copper mines, very large and impregnated with sulphur, is in a beautiful valley, surrounded, at the distance of ten or fifteen miles, with high mountains. This was the place appointed for meeting the Apaches, at 11, a. m.; but arriving at 12, and not finding them as we expected, and the grass all eaten up, we moved on to Night creek, making 30 miles. We halted at night on unknown ground, by the side of a creek, so miry that the mules, some of which had not drunk since morning, refused to approach it. It was dark; many of the men mistook the trail and got on the wrong side of the treacherous creek. The mules begun to bray for water, and the men to call out for their messmates; all were in confusion. My thoughts of last night came vividly to my mind, as I heard the voice of my chronometer man on the other side, asking to be shown the way across. I sent him word to retrace his steps two or three miles.

The assembly call was sounded, which seemed to settle all things; and, as far as the clouds would allow me, I obtained observations. This is only the second time since leaving the 100th degree of longitude that I have been interrupted by clouds in my observations. Nothing has been heretofore more rare than to see the heavens overcast.

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An Apache has just come in, and says the people who agreed to meet us at the spring yesterday are coming on with some mules to trade.

Three miles from the camp of last night we had reached the "divide," and from that point the descent was regular and continuous to Night creek. The ravines on either side of the "divide" are covered with fragments of blue limestone and rich specimens of the magnetic oxides of iron.

October 20.—My curiosity was excited to see by daylight how my camp was disposed and what sort of place we were in. It was quite certain the broad, level valley we had been traveling the last few miles was narrowing rapidly, by the intrusion of high precipices; and the proximity of great mountains in confused masses indicated some remarkable change in the face of the country. We were, in truth, but a few miles from the Gila, which I was no less desirous of seeing than the Del Norte.

The general sent word to the Apaches he would not start till 9 or 10. This gave them time to come in, headed by their chief, Red Sleeve. They swore eternal friendship to the whites, and everlasting hatred to the Mexicans. The Indians said that one, two or three white men might now pass in safety through their country; that if they were hungry, they would feed them; or, if on foot, mount them. The road was open to the American now and forever. Carson, with a twinkle of his keen hazel eye, observed to me, "I would not trust one of them."

The whole camp was now busily engaged in attempting to trade. The Indians had mules, ropes, whips and mezcal. We wished to get a refit in all save the mezcal, offering to give in exchange red shirts, blankets, knives, needles, thread, handkerchiefs, &c., &c.; but these people had such extravagant notions of our wealth, it was impossible to make any progress. At length the call of "boots and saddles" sounded. The order, quickness and quietude of our movements seemed to impress them. One of the chiefs, after eyeing the general with great apparent admiration, broke out in a vehement manner: "You have taken New Mexico, and will soon take California; go, then, and take Chihuahua, Durango and Sonora. We will help you. You fight for land; we care nothing for land; we fight for the laws of Montezuma and for food. The Mexicans are rascals; we hate and will kill them all." There burst out the smothered fire of three hundred years! Finding we were more indifferent than they supposed to trade, and that the column was in motion, they became at once eager for traffic.

They had seen some trumpery about my camp which pleased them, and many of them collected there. My packs were made. One of my gentlest mules at that moment took fright, and went off like a rocket on the back trail, scattering to the right and left all who opposed him. A large, elegant looking woman, mounted a straddle, more valiant than the rest, faced the brute and charged upon him at full speed. This turned his course back to the camp; and I rewarded her by half a dozen biscuit, and through her intervention, succeeded in trading two broken down mules for two

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C B Graham's Lith

MOUTH OF NIGHT CREEK

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good ones, giving two yards of scarlet cloth in the bargain. By this time a large number of Indians had collected about us, all differently dressed, and some in the most fantastical style. The Mexican dress and saddles predominated, showing where they had chiefly made up their wardrobe. One had a jacket made of a Henry Clay flag, which aroused unpleasant sensations, for the acquisition, no doubt, cost one of our countrymen his life. Several wore beautiful helmets, decked with black feathers, which, with the short shirt, waist belt, bare legs and buskins gave them the look of pictures of antique Grecian warriors. Most were furnished with the Mexican cartridge box, which consists of a strap round the waist, with cylinders inserted for the cartridges.

These men have no fixed homes. Their houses are of twigs, made easily, and deserted with indifference. They hover around the beautiful hills that overhang the Del Norte between the 31st and 32d parallels of latitude, and look down upon the States of Chihuahua and Sonora; and woe to the luckless company that ventures out unguarded by a strong force. Their hills are covered with luxuriant grama, which enables them to keep their horses in fine order, so that they can always pursue with rapidity and retreat with safety. The light and graceful manner in which they mounted and dismounted, always upon the right side, was the admiration of all. The children are on horseback from infancy. There was amongst them a poor deformed woman, with legs and arms no longer than an infant's. I could not learn her history, but she had a melancholy cast of countenance. She was well mounted, and the gallant manner in which some of the plumed Apaches waited on her, for she was perfectly helpless when dismounted, made it hard for me to believe the tales of blood and vice told of these people. She asked for water, and one or two were at her side; one handed it to her in a tin wash basin, which, from its size, was the favorite drinking cup.

We wended our way through the narrow valley of Night creek. On each side were huge stone buttes shooting up into the skies.

At one place we were compelled to mount one of these spurs almost perpendicular. This gave us an opportunity of seeing what a mule could do. My conclusion was, from what I saw, that they could climb nearly as steep a wall as a cat. A pack slipped from a mule, and, though not shaped favorably for the purpose, rolled entirely to the base of the hill, over which the mules had climbed.

A good road was subsequently found turning the spur and following the creek, until it debouched into the Gila, which was only a mile distant.

Some hundred yards before reaching this river the roar of its waters made us understand that we were to see something different from the Del Norte. Its section, where we struck it, (see the map,) 4,347 feet above the sea, was 50 feet wide and an average of two feet deep. Clear and swift, it came bouncing from the great mountains which appeared to the north about 60 miles distant. We crossed the river, its large round pebbles and swift current causing the mules to tread wearily.

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We followed its course, and encamped under a high range of symmetrically formed hills overhanging the river. Our camp resembled very much the centre of a yard of huge stacks.

We heard the fish playing in the water, and soon those who were disengaged were after them. At first it was supposed they were the mountain trout, but, being comparatively fresh from the hills of Maine, I soon saw the difference. The shape, general appearance, and the color are the same; at a little distance, you will imagine the fish covered with delicate scales, but on a closer examination you will find that they are only the impression of scales. The meat is soft, something between the trout and the cat-fish, but more like the latter. They are in great abundance.

We saw here also, in great numbers, the blue quail. The bottom of the river is narrow, covered with large round pebbles. The growth of trees and weeds was very luxuriant; the trees chiefly cotton-wood, a new sycamore, mezquite, pala, (the tallow tree of our hunters,) a few cedars, and one or two larch. There were some grape and hop vines.

16 circum-meridian observations beta aquarii, and 9 of polaris, give the latitude of this camp 32° 50′ 08″. Its approximate longitude is 108° 45′ 00″.

October 21.—After going a few miles, crossing and recrossing the river a dozen times, it was necessary to leave its bed to avoid a cañon. This led us over a very broken country, traversed by huge dykes of trap and walls of basalt. The ground was literally covered with the angular fragments of these hard rocks.

From one of these peaks we had an extended view of the country in all directions. The mountains run from northwest to southeast, and rise abruptly from the plains in long narrow ridges, resembling trap dykes on a great scale. These chains seem to terminate at a certain distance to the south, leaving a level road, from the Del Norte about the 32d parallel of latitude, westward to the Gila. These observations, though not conclusive, agree with the reports of the guides, who say Colonel Cooke will have no difficulty with his wagons.

The mountains were of volcanic rock of various colors, feldspathic granite, and red sand stone, with a dip to the northwest, huge hills of a conglomerate of angular and rounded fragments of quartz, basalt, and trap cemented by a substance that agrees well with the description I have read of the puzzolana of Rome.

The earth in the river bed, where it was not paved with the fragments of rocks, was loose, resembling volcanic dust, making it unsafe to ride out of the beaten track. A mule would sometimes sink to his knee; but the soil was easily packed, and three or four mules in advance made a good firm trail.

This was a hard day on the animals, the steep ascents and descents shifting the packs, and cutting them dreadfully.

The howitzers did not reach camp at all.

A few pounds of powder would blast the projections of rock from the cañon, and make it passable for packs, and possibly for wagons also. The route upon which the wagons are to follow is,

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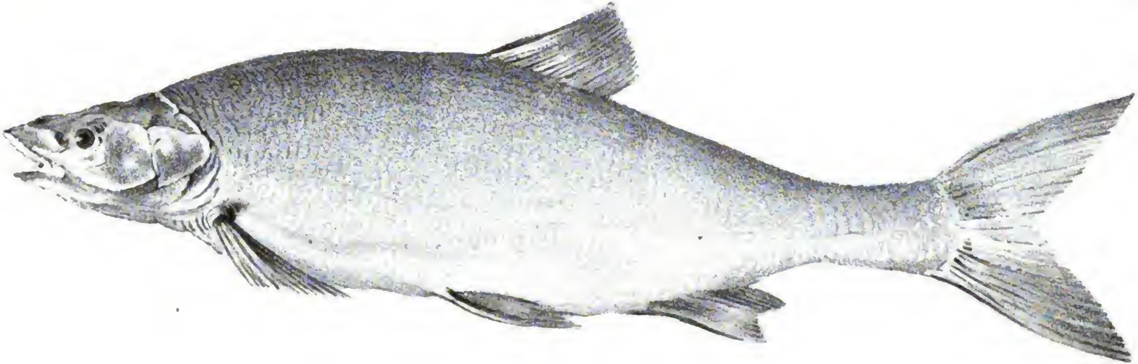

GILA TROUT.

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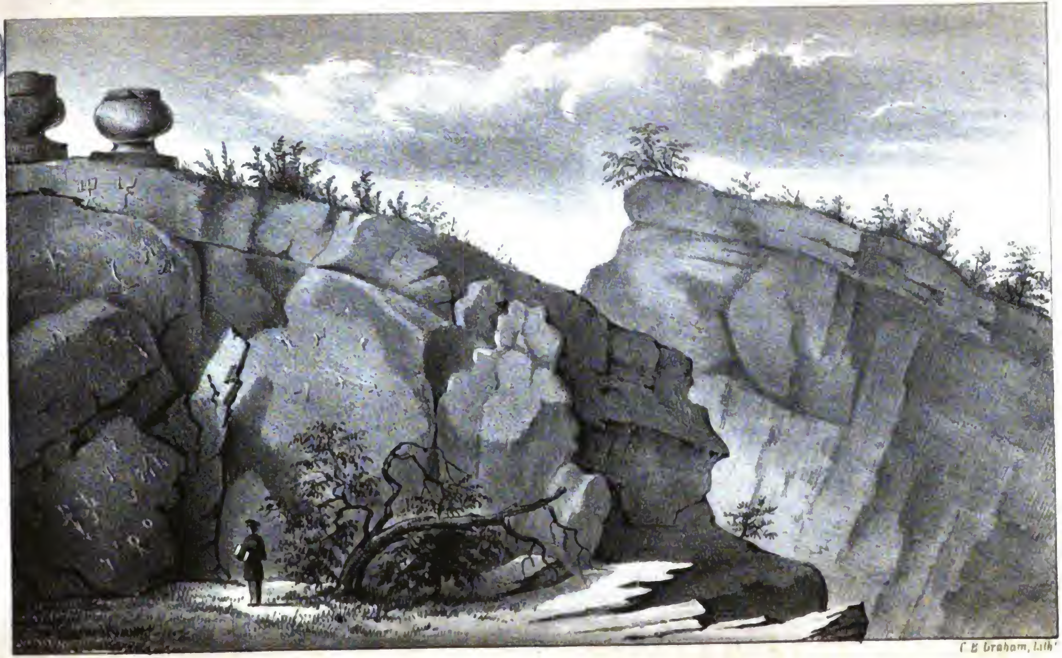

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however, to the south of this. Under this date, in the catalogue of plants will be found many differing from those heretofore observed; amongst them the zanschneria Californica, also a new shrub with an edible nut, a grass allied to the grama, Adam's needle, artemisia cana, and many varieties of mezquite.

October 22.—The howitzers came up about nine o'clock, having, in the previous day's work, their shafts broken, and, indeed, everything that was possible to break about them. We again left the river to avoid a cañon, which I examined in several places, and saw no obstacles to a good road. The cañon was formed by a seam of basalt, overlaying limestone and sand-stone in regular strata. Through these the river cuts its way.

Many deep arroyos have paid tribute to the Gila, but in none have we yet found water. Following the bed of one of these, to examine the eccentric geological formation it displayed, I found unknown characters written on a rock, copies of which were made, but their antiquity is questionable.

We were now fast approaching the ground where rumor and the maps of the day place the ruins of the so called Aztec towns. This gave the characters alluded to additional interest; they were indented on a calcareous sandstone rock, chrome colored on the outside, presenting a perfectly white fracture. This made them very conspicuous, and easily seen from a distance. The coloring matter of the external face of the rock may proceed from water, as there was above the characters a distinct water-line, and every appearance that this gorge had more than once been the scene of overflows and devastation.

We encamped on a bluff high above the river, in view of a rock which we named, from its general appearance, Steeple rock.

Latitude of our camp to-night, by 17 circum-meridian altitudes of beta aquarii, 32° 38′ 13″. Longitude 109° 07′ 30″.

October 23.—Last night the heavens became overcast, the air damp, and we expected for the first time since leaving Santa Fé, (a month to-morrow,) to have a sprinkle of rain; but, at 9 this morning, the clouds had all been chased away, and the sun careered up in undisputed possession of all above the horizon. The atmosphere resumed its dryness and elasticity, and at night the stars looked brighter, and the depth of the spaces between greater, than ever.

The changes of temperature are very great, owing to the distance from the influence of large masses of water, and, if they were accompanied by corresponding changes in humidity, they would be insupportable. Last night we went to bed with the thermometer at 70° Fahrenheit, and awakened this morning shivering, the thermometer marking 25°; yet, notwithstanding, our blankets were as dry as though we had slept in a house.

The table land, 150 feet above the river, was covered so thick with large paving pebbles, as to make it difficult to get a smooth place to lie upon.

The growth of to-day and yesterday, on the hills and in the valleys, very much resembles that on the Del Norte, the only exceptions being a few new and beautiful varieties of the cactus. After

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leaving our last night's camp, for a mile, the general appearance, width of the valley, and soil, much resemble the most fertile parts of that river. This, so far, has decidedly the best soil, and the fall of the river being greater, makes it more easy to irrigate.

To-day we passed one of the long sought ruins. I examined it minutely, and the only evidences of handicraft remaining, were immense quantities of broken pottery, extending for two miles along the river. There were a great many stones, rounded by attrition of the water, scattered about; and, if they had not occasionally been disposed in lines forming rectangles with each other, the supposition would be, that they had been deposited there by natural causes.

October 24.—To-day we laid by to recruit. Although the moon was not in a favorable position, I availed myself of the opportunity to get a few lunar distances. 18 circum-meridian altitude of beta aquarii, and 12 altitudes of polaris, give for the latitude of the place 32° 44′ 52″, and 8 distances between ☾ and Fomalhaut give for the longitude 109° 22′ 00″. We feasted to-day on the blue quail and teal, and at night Stanly came in with a goose. "Signs" of beaver and deer were very distinct; these, with the wolf, constitute the only animals yet traced on the river.

October 25.—The general character of the country is much the same as before represented; but towards camp, it broke into irregular and fantastic looking mountains. A rose-colored tint was imparted to the whole landscape, by the predominance of red feldspar. The road became broken and difficult as it wound its way around two short cañons.

We were now in the regions made famous in olden times by the fables of Friar Marcos, and eagerly did we ascend every mound, expecting to see in the distance what I fear is but the fabulous "Casa Montezuma." Once, as we turned a sharp hill, the bold outline of a castle presented itself, with the tops of the walls horizontal, the corners vertical, and apparently one front bastioned. My companion agreed with me that we at last beheld this famed building; on we spurred our unwilling brutes; restless for the show, I drew out my telescope, when to my disappointment a clay butte, with regular horizontal seams, stood in the place of our castle; but to the naked eye the delusion was complete. It is not impossible that this very butte, which stands on an imposing height in the centre of a vast amphitheatre of turreted hills, has been taken by the trappers, willing to see, and more especially to report marvellous things, for the "Casa Montezuma." The Indians here do not know the name Aztec. Montezuma is the outward point in their chronology; and as he is supposed to have lived and reigned for all time preceding his disappearance, so do they speak of every event preceding the Spanish conquest as of the days of Montezuma.

The name, at this moment, is as familiar to every Indian, Puebla, Apache, and Navajoe, as that of our Saviour or Washington is to us. In the person of Montezuma, they unite both qualities of divinity and patriot.

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We passed to-day the ruins of two more villages similar to those of yesterday. The foundation of the largest house seen yesterday was 60 by 20 feet; to-day, 40 by 30. About none did we find any vestiges of the mechanical arts, except the pottery; the stone forming the supposed foundation was round and unhewn, and some cedar logs were also found about the houses, much decayed, bearing no mark of an edged tool. Except these ruins, of which not one stone remained upon another, no marks of human hands or footstep have been visible for many days, until to-day we came upon a place where there had been an extensive fire. Following the course of this fire, as it bared the ground of the shrubbery, and exposed the soil, &c., to view, I found what was to us a very great vegetable curiosity, a cactus, 18 inches high, and 18 inches in its greatest diameter, containing 20 vertical volutes, armed with strong spines. When the traveller is parched with thirst, one of these, split open, will give sufficient liquid to afford relief. Several of these cacti were found nearly torn from the earth, and lying in the dry bed of a stream.

These and the mezquite, acacia, prosopis odorata, and prosopis glandulosa, now form the principal growth. Under the name mezquite, the voyageur comprises all the acacia and prosopis family.

Last night, about nine o'clock, I heard the yell of a wolf, resembling that of a four months' old pup. In a few minutes there was a noise like distant thunder. "Stampede!" shouted a fellow, and in an instant every man was amongst the mules. With one rush they had broken every rope; and this morning, when we started, one of our mules was missing, which gave us infinite annoyance. Our party is so economically provided that we could not afford to lose even a mule, and I left four men to look it up, who did not rejoin us till night.

A question arose involving a serious point of mountain law, which differs somewhat from prairie law. One of my party captured a beautiful dun colored mule, which was claimed by another party; the one claiming the prize for having first seen the animal and then catching it with the lazo. The other pleaded ownership of the rope, used as a lazo, as its title. It was settled to the satisfaction of the first.

The mule was one which Carson had left on his way out, and on being asked why he did not claim it, he said it was too young to be useful in packing, and as we now had plenty of beef, it would not be required for food, and he did not care about it.

October 26.—Soon after leaving camp, the banks of the river became gullied on each side by deep and impassable arroyos. This drove us insensibly to the mountains, until at length we found ourselves some thousand feet above the river, and it was not until we had made sixteen miles that we again descended to it. This distance occupied eight and a half hours of incessant toil to the men, and misery to our best mules. Some did not reach camp at all, and when the day dawned one or two, who had lost their way, were seen on the side of the mountain, within a few steps of a high precipice, from which it required some skill to extricate them. The men named this pass "the Devil's turnpike," and I see no reason to

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change it. The whole way was a succession of steep ascents and descents, paved with sharp, angular fragments of basalt and trap. The metallic clink of spurs, and the rattling of the mule shoes, the high black peaks, the deep dark ravines, and the unearthly looking cactus, which stuck out from the rocks like the ears of Mephistopheles, all favored the idea that we were now treading on the verge of the regions below. Occasionally a mule gave up the ghost, and was left as a propitiatory tribute to the place. This day's journey cost us some twelve or fifteen mules; one of mine fell headlong down a precipice, and, to the surprise of all, survived the fall.

The barometric height was taken several times to-day. Long and anxious was my study of these mountains, to ascertain something of their general direction and form. Those on the north side swept in something like a regular curve from our camp of last night to the mouth of the San Carlos, deeply indented in two places by the ingress into the Gila of the Prierte (Black) and Azul (Blue) rivers. Those on the south, where we passed, were a confused mass of basalt and trap, and I could give no direction to the axis of maximum elevation. They seemed to drift off to the southeast. Wherever the eye wandered, huge mountains were seen of black, volcanic appearance, of very compact argillaceous limestone, tinged at times with scarlet from the quantities of red feldspar. Through these the Gila (now swift) has cut its narrow way with infinite labor, assisted by the influx of the Prierte, the Azul and San Carlos rivers. As the story goes, the Prierte flows down from the mountains, freighted with gold. Its sands are said to be full of this precious metal. A few adventurers, who ascended this river hunting beaver, washed the sands at night when they halted, and were richly rewarded for their trouble. Tempted by their success, they made a second trip, and were attacked and most of them killed by the Indians. My authority for this statement is Londeau, who, though an illiterate man, is truthful.

October 27.—After yesterday's work we were obliged to lay by to-day. The howitzers came up late in the afternoon. They are small, mounted on wheels ten feet in circumference, which stand apart about three feet, and with the assistance of men on foot, are able to go in almost any place a mule can go.

I strolled a mile or two up the San Carlos, and found the whole distance, it has its way in a narrow cañon, worn from the solid basalt. On either side, in the limestone under the basalt were immense cavities, which must have been at times the abodes of Indians and the dens of beasts. The remains of fire and the bones of animals attested this. Near its mouth we found the foundation of a rectangular house, and on a mound adjacent that of a circular building, a few feet in diameter. The ruin was probably that of a shepherd's house, with a circular building adjoining as a look-out, as there was no ground in the neighborhood which was suited for irrigation. Both these ruins were of round unhewn stones, and the first was surrounded by pieces of broken pottery. Digging a few feet brought us to a solid mass which was most likely a dirt floor, such as is now used by the Spaniards.

In my walk I encountered a settlement of tarantulas; as I approached, four or five rushed to the front of their little caves in an

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attitude of defence. I threw a pebble at them, and it would be hard to imagine, concentrated in so small a space, so much expression of defiance, rage, and ability to do mischief, as the tarantula presents.

Our camp was near an old Apache camp. The carcasses of cattle in every direction betokened it to have been the scene of a festival after one of their forays into the Spanish territory.

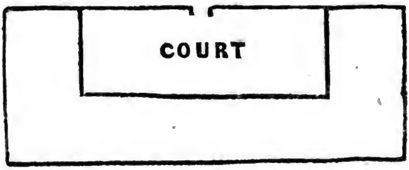
The Gila at this place is much swollen by the affluence of the three streams just mentioned, and its cross section here is about 70 feet by 4. The waters change their color, and are slightly tainted with salt; indeed, just below our camp there came from the side of an impending mountain, a spring so highly charged with salt as to be altogether unpalatable. Several exquisite ferns were plucked at the spring, and a new green-barked acacia, covering the plains above the river bed, but vegetation generally was very scarce; this is the first camp since leaving the Del Norte, in which we have not had good grass.

At 8*h*. 40*m*., a meteor of surpassing splendor started under constellation lyra, about 20 degrees above the horizon, and went off towards the south, projected against a black cloud.

The clouds interfered with my observations; but such as they were, 12 altitudes of polaris, 9 of alpha andromedæ, and 9 of alpha lyræ, and 16 distances between the ☽ and alpha pegasi, gave the latitude of the camp 32° 53′ 16″, and the longitude 109° 31′ 34″.

October 28.—One or two miles' ride, and we were clear of the Black mountains, and again in the valley of the Gila, which widened out gradually to the base of Mount Graham, abreast of which we encamped. Almost for the whole distance, twenty miles, were found at intervals the remains of houses like those before described. Just before reaching the base of Mount Graham, a wide valley, smooth and level, comes in from the south-east. Up this valley are trails leading to San Bernadino, Fronteras and Tucsoon. Here also the trail by the Ojo Cavallo comes in turning the southern abutments of the Black mountains, along which Capt. Cook is to come with his wagons.

At the junction of this valley with the Gila are the ruins of a large settlement. I found traces of a circular wall 270 feet in circumference. Here also was one circular enclosure of 400 yards. This must have been for defence. In one segment was a triangular shaped indenture, which we supposed to be a well. Large mezquite now grow in it, attesting its antiquity. Most of the houses are rectangular, varying from 20 to 100 feet front; many were of the form of the present Spanish houses, thus:



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Red cedar posts were found in many places, which seemed to detract from their antiquity, but for the peculiarity of this climate, where vegetable matter seems never to decay. In vain did we search for some remnant which would enable us to connect the inhabitants of these long deserted buildings with other races. No mark of an edge tool could be found, and no remnant of any household or family utensils, except the fragments of pottery which were every where strewed on the plain, and the rude corn grinder still used by the Indians. So great was the quantity of this pottery, and the extent of ground covered by it, that I have formed the idea it must have been used for pipes to convey water. There were about the ruins quantities of the fragments of agate and obsidian, the stone described by Prescott as that used by the Aztecs to cut out the hearts of their victims. This valley was evidently once the abode of busy, hard-working, people. Who were they? And where have they gone? Tradition among the Indians and Spaniards does not reach them.

I do not think it improbable that these ruins may be those of comparatively modern Indians,* for Venegas says: "The father Jacob Sedelmayer, in October, 1744, set out from his mission, (Tubutuma,) and, after travelling 80 leagues, reached the Gila, where he found six thousand Papagos, and near the same number of Pimos and Coco Maricopas;" and the map which he gives of this country, although very incorrect, represents many Indian settlements and missions on this river. His observations, however, were confined to that part of the Gila river near its mouth.

Great quantities of green-barked acacia on the table lands, and also the chamiza, wild sage and mezquite; close to the river, cotton wood and willow. We found, too, amongst many other plants, the eriodictyon Californicum, several new grasses, and a sedge, very few of which have been seen on our journey.

We saw the trail of cannon up the valley very distinct; that of an expedition from Sonora against the Indians, which was made a few years since, without achieving any results.

Wherever the river made incisions, was discoverable a metamorphic, close grained, laminated sandstone, and in many places were seen buttes of vitrified quartz, (semi-opal.)

October 29.—The dust was knee deep in the rear of our trail; the soil appeared good, but, for whole acres, not the sign of vegetation was to be seen. Grass was at long intervals, and, when found, burned to cinder. A subterraneous stream flowed at the foot of Mount Graham, and fringed its base with evergreen. Every where there were marks of flowing water, yet vegetation was so scarce and crisp that it would be difficult to imagine a drop of water had fallen since last winter. The whole plain, from 3 to 6 miles wide, is within the level of the waters of the Gila, and might easily be irrigated, as it no doubt was by the former tenants of these ruined houses.

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* Since these notes were written, a very interesting letter was received from the venerable Mr. Gallatin connected with the history of these ruins. The letter, with my reply, will be found in the Appendix.

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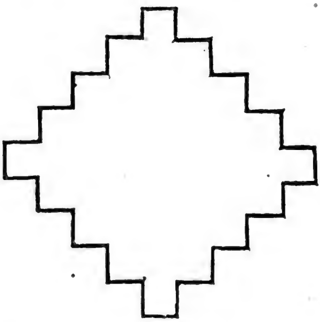
The crimson tinted Sierra Carlos skirted the river on the north side the whole day, and its changing profiles formed subjects of study and amusement. Sometimes we could trace a Gothic steeple; then a horse; now an old woman's face; and, again, a veritable steamboat; but this required the assistance of a light smoky cloud, drifting to the east, over what represented the chimney stack. Wherever the river abraded its banks, was seen, in horizontal strata, a yellowish argillaceous limestone.

October 30.—Mount Turnbull, terminating in a sharp cone, had been in view down the valley of the river for three days. To-day about three o'clock, p. m., we turned its base forming the northern terminus of the same chain, in which is Mt. Graham.

Half a mile from our camp of last night was another very large ruin which appeared, as well as I could judge, (my view being obstructed by the thick growth of mezquite,) to have been the abode of five or ten thousand souls. The outline of the buildings and the pottery presented no essential difference from those already described. But about eleven miles from the camp, on a knoll, overlooked in a measure by a tongue of land, I found the trace of a solitary house, somewhat resembling that of a field work *en cremallière*. The enclosure was complete, and the faces varied from ten to thirty feet. The accompanying cut will give a more accurate idea than words.



Clouds had been seen hovering over the head of Mount Turnbull; and as we passed, the beds of the arroyos leading from it were found to be damp, showing the marks of recent running water.

Last evening about dusk, one of my men discovered a drove of wild hogs, and this morning we started on their trail, but horse flesh had now become so precious that we could not afford to follow any distance from our direction, and although anxious to get a genuine specimen of this animal, we gave up the chase and dropped in the rear of the column. The average weight of these animals is about 100 pounds, and their color invariably light pepper and salt. Their flesh is said to be palatable, if the musk which lies near the back part of the spine is carefully removed.

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Many "fresh signs" of Indians were seen, but, as on previous days, we could not catch a glimpse of them. They carefully avoided us. This evening, however, as Robideaux unarmed was riding in advance, he emerged suddenly from a cavity in the ground, thickly masqued by mezquite. He had discovered two Indians on horse back within twenty yards of him. The interview was awkward to both parties, but Robideaux was soon relieved by the arrival of the head of our column. The Indians were thrown into the greatest consternation; they were tolerably mounted, but escape was hopeless. Two more miserable looking objects I never beheld; their legs, (unlike the Apaches we left behind) were large and muscular, but their faces and bodies (for they were naked,) were one mass of wrinkles, almost approaching to scales. They were armed with bows and arrows, and one with a quiver of fresh cut reeds. Neither could speak Spanish, and the communication was by signs. They were directed to go with us to camp, where they would receive food and clothing; but they resolutely refused, evidently thinking certain death awaited them, and that it would be preferable to meet it then than suffer suspense. The chief person talked all the time in a tongue resembling more the bark of a mastiff, than the words of a human being. Our anxiety to communicate to the tribe our friendly feeling, and more especially our desire to purchase mules, was very great; but they were firm in their purpose not to follow, and much to their surprise, (they seemed incapable of expressing joy,) we left them and their horses untouched.

They were supposed by some to be the Cayotes, a branch of the Apaches, but Londeau thought they belonged to the tribe of Tremblers, who acquired their name from their emotions at meeting the whites.

Observed to-night 12 altitudes of polaris for latitude, and measured 9 lunar distances for longitude.

Lat. 33° 12′ 10″. Long. 110° 20′ 46″.

October 31.—To-day we were doomed to another sad disappointment. Reaching the San Francisco about noon, we unsaddled to refresh our horses and allow time to look up a trail by which we could pass the formidable range of mountains through which the Gila cut its way, making a deep cañon impassable for the howitzers. A yell on the top of a distant hill announced the presence of three well mounted Indians, and persons were sent out to bring them in. Our mules were now fast failing, and the road before us unknown. These Indians, if willing, could supply us with mules and show us the road. Our anxiety to see the result of the interview was, consequently, very great. It was amusing, and at the same time very provoking. They would allow but one of our party to approach. Long was the talk by signs and gestures; at length they consented to come into camp, and moved forward about a hundred yards, when a new apprehension seemed to seize them, and they stopped. They said, as well as could be understood, that the two old men we met yesterday had informed their chief of our presence, and wish to obtain mules; that he was on his way with some, and had sent *them* ahead to sound a parley. They were better

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looking, and infinitely better conditioned, than those we met yesterday, resembling strongly the Apaches of the copper mines, and like them decked in the plundered garb of the Mexicans.

The day passed, but no Indians came; treacherous themselves, they expect treachery in others. At everlasting war with the rest of mankind, they kill at sight all who fall in their power. The conduct of the Mexicans to them is equally bad, for they decoy and kill the Apaches whenever they can. The former Governor of Sonora employed a bold and intrepid Irishman, named Kirker, to hunt the Apaches He had in his employment whites and Delaware Indians, and was allowed, besides a per diem, $100 per scalp, and $25 for a prisoner. A story is also told of one Johnson, an Englishman, an Apache trader, who, allured by the reward, induced a number of these people to come to his camp, and placed a barrel of flour for them to help themselves; when the crowd was thickest of men, women, and children, he fired a six pounder amongst them from a concealed place and killed great numbers.

13 circum-meridian altitudes of beta aquarii, and 10 altitudes of polaris give the latitude of this camp 33° 14′ 29″. The longitude by 12 lunar distances E. and W. is 110° 30′ 24″.

November 1.—No alternative seemed to offer but to pursue Carson's old trail sixty miles over a rough country, without water, and two, if not three days' journey. Under this, in their shattered condition, our mules must sink. We followed the Gila river six or seven miles, when it became necessary to leave it, how long was uncertain. Giving our animals a bite of the luxurious grama on the river banks, we filled every vessel capable of holding water, and commenced the jornada. The ascent was very rapid, the hills steep, and the footing insecure. After travelling five or six miles, ascending all the way, we found trails from various directions converging in front of us, evidently leading to a village or a spring; it proved to be the last. The spring consisted of a few deep holes, filled with delicious water, overgrown with cotton wood; and, although the grass was not good, we determined to halt for the night, as the howitzers were not yet up, and it was doubtful when we should meet with water again. I took advantage of the early halt to ascend, with the barometer, a very high peak overhanging the camp, which I took to be the loftiest in the Piñon Lano range on the north side of the Gila.

Its approximate height was only 5,724 feet above the sea. The view was very extensive; rugged mountains bounded the entire horizon. Very far to the northeast was a chain of mountains covered with snow, but I could not decide whether it was the range on the east side of the Del Norte or the Sierras Mimbres. Near the top of this peak the mezcal grew in abundance, and with the stalk of one 25 feet long we erected a flag-staff. Here too we found huge masses of the conglomerate before described, apparently as if it had been arrested in rolling from an impending height, but there was no point higher than this for many miles, and the intervening ravines were deep. Lower down we found a large mass of many thousand tons of the finer conglomerate, the shape of a trun-

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cated pyramid standing on its smallest base. It appeared so nicely balanced, a feather might have overthrown it. A well levelled seat of large slabs of red ferruginous sand-stone altered by heat indicated we were not on untrodden ground. It was the watch-tower of the Apache; from it he could track the valley of the Gila beyond the base of Mount Graham.

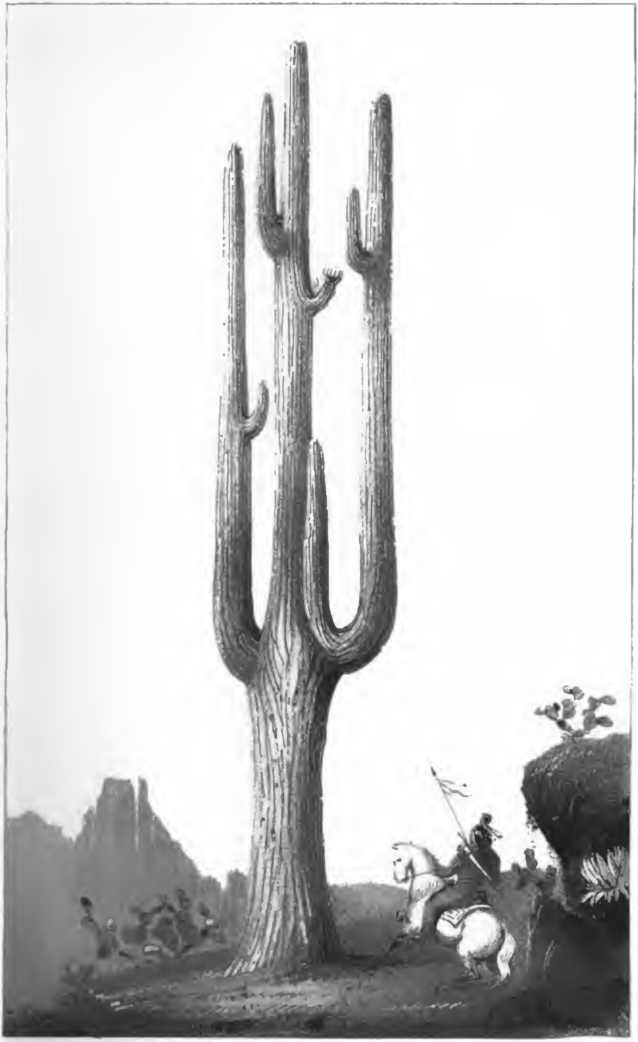
At the point where we left the Gila, there stands a cactus six feet in circumference, and so high I could not reach half way to the top of it with the point of my sabre by many feet; and a short distance up the ravine is a grove of these or pitahaya, much larger than the one I measured, and with large branches. These plants bear a saccharine fruit much prized by the Indians and Mexicans. "They are without leaves, the fruit growing to the boughs. The fruit resembles the burr of a chesnut and is full of prickles, but the pulp resembles that of the fig, only more soft and luscious." In some it is white, in some red, and in others yellow, but always of exquisite taste.

A new shrub bearing a delicious nutritious nut and in sufficient abundance to form an article of food for the Apaches. Mezcal and the fruit of the agave Americana, and for the first time arctostaphylos pungens. Two or three new shrubs and flowers.

The formation near the mouth of the San Francisco is diluvion, overlaying a coarse grained highly calcareous sand-stone and limestone. The mountains were chiefly of granite with red feldspar, and near our camp was discernible a stratum of very compact argillaceous lime-stone, dipping nearly vertically to the west.

November 2.—The call to water sounded long before day-light, and we ate breakfast by the light of the moon; the thermometer at 25°. As day dawned we looked anxiously for the howitzers, which were beginning to impede our progress very much. My camp was pitched on the opposite side of a ravine some distance apart from the main camp, the horses were grazing on the hill side still beyond and out of sight. We were quietly waiting for further orders, when our two Mexican herdsmen came running into camp much alarmed and without their arms, exclaiming: "The Indians are driving off the mules. "To arms" was shouted, and before I could loosen a pistol from the holster my little party were in full run to the scene of alarm, each with his rifle. On turning the hill we found the horses tranquilly grazing, but the hill overlooking them was lined with horsemen. As we advanced, one of the number hailed us in Spanish, saying he wished to have "a talk."

They were Apaches, and it had been for some time our earnest desire to trade with them, and hitherto we had been unsuccessful. "One of you put down your rifle and come to us," said the Spanish-tongued Indian. Londeau, my employé before-mentioned, immediately complied, I followed; but before reaching half-way up the steep hill, the Indian espied in my jacket the handle of a large horse pistol. He told me I must put down my pistol before he would meet me. I threw it aside and proceeded to the top of the hill, where, although he was mounted and surrounded by six or eight of his own men armed with rifles and arrows, he received me


C. B. Graham, Lith.

CEREUS GIGANTEUS.

"Engleman, Appendix N° 2 Continued"

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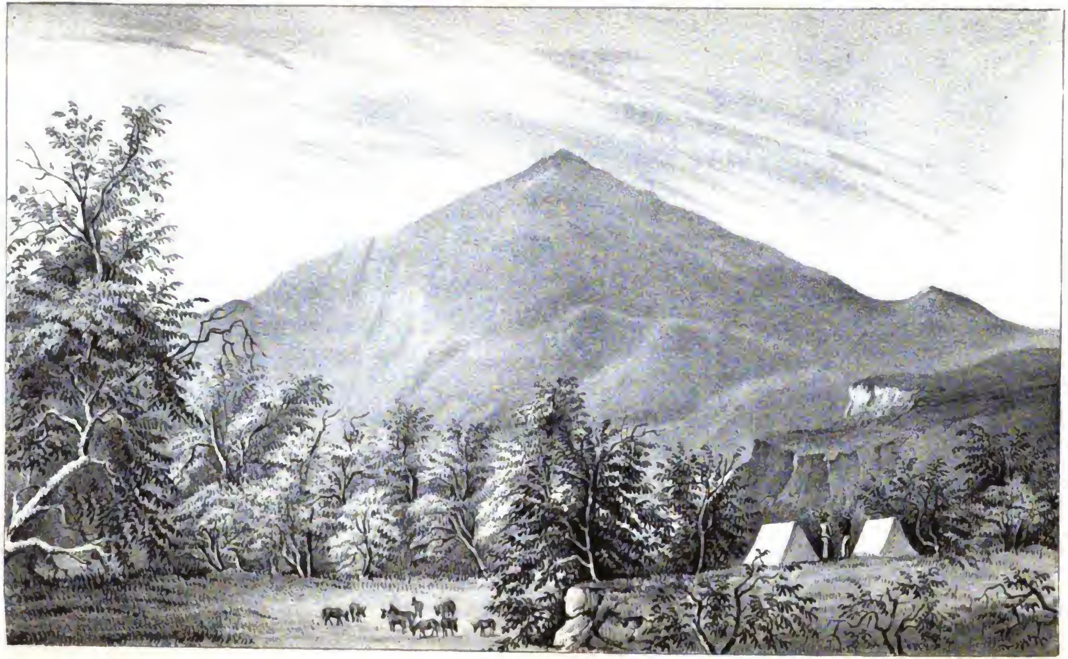
C. B. Graham, Lith.

MOUNT GRAHAM

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with great agitation. The talk was long and tedious. I exhausted every argument to induce him to come into camp. His principal fear seemed to be the howitzers, which recalled at once to my mind the story I had heard of the massacre by Johnson. At last a bold young fellow tired of the parley threw down his rifle, and with a step that Forrest in Metamora might have envied, strode off towards camp, piloted by Carson. We were about to follow when the chief informed us it would be more agreeable to him if we remained until his warrior returned.

The ice was now broken, most of them seeing that their comrade encountered no danger, followed one by one. They said they belonged to the tribe of Piñon Lanos; that "they were simple in head, but true of heart." Presents were distributed; they promised a guide to pilot us over the mountain, five miles distant, to a spring with plenty of good grass, where they engaged to meet us next day with 100 mules.

The mezcal flourishes here; and at intervals of a half a mile or so we found several artificial craters, into which the Indians throw this fruit, with heated stones, to remove the sharp thorns and reduce it to its saccharine state.

Observed last night for latitude and time, and our position is in latitude 33° 14′ 54″, longitude 110° 45′ 06″. Our camp was on the the head of a creek which, after running in a faint stream one hundred yards, disappeared below the surface of the earth. On its margin grew a species of ash unknown in the United States, and the California plane tree, which is also distinct in species from our sycamore.

November 3.—Our expectations were again disappointed, the Indians came, but only seven mules were the result of the days' labor, not a tenth of the number absolutely required.

Our visiters to-day presented the same motley group we have always found the Apaches. Amongst them was a middle-aged woman, whose garrulity and interference in every trade was the annoyance of Major Swords, who had charge of the trading, but the amusement of the by-standers.

She had on a gauze-like dress, trimmed with the richest and most costly Brussels lace, pillaged no doubt from some fandango-going belle of Sonora; she straddled a fine grey horse, and whenever her blanket dropped from her shoulders, her tawny form could be seen through the transparent gauze. After she had sold her mule, she was anxious to sell her horse, and careered about to show his qualities. At one time she charged at full speed up a steep hill. In this, the fastenings of her dress broke, and her bare back was exposed to the crowd, who ungallantly raised a shout of laughter. Nothing daunted, she wheeled short round with surprising dexterity, and seeing the mischief done, coolly slipped the dress from her arms and tucked it between her seat and the saddle. In this state of nudity she rode through camp, from fire to fire, until, at last, attaining the object of her ambition, a soldier's red flannel shirt, she made her adieu in that new costume.

A boy about 12 years of age, of uncommon beauty, was among

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our visiters. Happy, cheerful, and contented, he was consulted in every trade, and seemed an idol with the Apaches. It required little penetration to trace his origin from the same land as the gauze of the old woman. We tried to purchase him, but he said it was *long*, *long*, since he was captured, and that he had no desire to leave his master who, he was certain, would not sell him for any money. All attempts were vain, and the lad seemed gratified both at the offer to purchase, and the refusal to sell. Here we found the mountains chiefly of red ferruginous sandstone, altered by heat.

November 4.—Six miles from our camp of last night we reached a summit, and then commenced descending again rapidly towards the Gila, along a deeply cañoned valley, the sands of which were black with particles of oxide and peroxide of iron. Near the summit, the hills on each side were of old red sandstone, with strata sloping to the southwest at an agle of 25°, and under this were strata of black slate and compact limestone, and then granite.

In the ravines we found, at places, a luxuriant growth of sycamore, ash, cedar, pine, nut-wood, mezcal, and some walnut, the edible nut again, Adam's needle, small evergreen oak and cottonwood, and a gourd the cucumis perennis.

There was every indication of water, but none was procured on the surface; it could, no doubt, have been found by digging, but the Gila was only twenty miles distant.

The last six or eight miles of our route was down the dry bed of a stream, in a course east of south, and our day's journey did not gain much in the direction of California. It was necessary to ascend the river a mile in search of grass, and then we got but an indifferent supply. Except in the two camps nearest to Mount Turnbull, and the one at the San Carlos, we have never before, since leaving Santa Fé, had occasion to complain of the want of grass.

We encamped in a grove of cacti of all kinds; amongst them the huge pitahaya, one of which was fifty feet high.

Geological formation on this slope of the Piñon Lano Mountains: 1st. Conglomerate of sandstone and pebbles; then, red sandstone in layers a foot thick; then, granite very coarse. The depth of the two first was many hundred feet, and in some places its stratification much deranged. Many large masses of sandstone, with thin seams of vitrified quartz.

In the dry creek down which we travelled, we saw a cave of green sandstone, in which a fire had been built; for what purpose I cannot conjecture, as it was too small to admit a man.

The Apaches gave us to understand that a marauding party of their people were in Sonora. The broad fresh trail of cattle and horses leading up the arroyo, induces the belief that they have returned—successful, of course.

Last night was mild, the thermometer at 63° Fahrenheit; and, what was very unusual here, the heavens were overcast, which prevented my getting the rate of the chronometers.

Although we have had no rain except at Mount Graham, where

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C.P. Graham, Lith.

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we had a shower which scarcely sufficed to lay the dust; yet the whole face of the country bears marks of rains, and running water met with in no other part of our journey. The absence of vegetation will, in some measure, account for the deep incisions made by running water in the earth.

November 5.—The howitzers did not reach camp last night, yet, the grass was so bad, and our beds, on the round pebbles everywhere covering the surface of the ground, so uncomfortable, it was determined to move camp.

The Gila now presents an inhospitable look; the mountains of trap, granite, and red sandstone, in irregular and confused strata, but generally dipping sharply to the south, cluster close together; and one ignorant of the ground could not tell from what direction the river came, or in what direction it flowed onwards to its mouth. The valley, not more than 300 feet from base to base of these perpendicular mountains, is deep, and well grown with willow, cottonwood, and mezquite.

At several places, perpendicular walls of trap dyke projected from the opposite side of the river, giving the idea that the river waters had once been dammed up, and then liberated by the blow of a giant; for the barrier was shattered—not worn away. In the course of six miles we had crossed and re-crossed the river twice as many times, when we left it by turning abruptly up a dry ravine to the south. This we followed for three miles, and crossed a ridge at the base of Saddle-Back mountain, (so named from its resemblance to the outline of a saddle,) and descended by another dry creek to the San. Pedro, running nearly north.

The valley of this river is quite wide, and is covered with a dense growth of mezquite, (acacia prosopis,) cotton wood, and willow, through which it is hard to move without being unhorsed. The whole appearance gave great promise, but a near approach exhibited the San Pedro, an insignificant stream a few yards wide, and only a foot deep.

For six miles we followed the Gila. The pitahaya and every other variety of cactus flourished in great luxuriance. The pitahaya, tall, erect, and columnar in its appearance, grew in every crevice from the base to the top of the mountains, and in one place I saw it growing nearly to its full dimensions from a crevice not much broader than the back of my sabre. These extraordinary looking plants seem to seek the wildest and most unfrequented places.

The range of mountains traversed to-day is the same we have been in for some days, and is a continuation of that of Mount Graham, which turns sharply westward from Turnbull's peak, carrying with it the Gila.

Saddle-Back is an isolated peak of red sandstone that has every appearance of having once formed the table land, and being harder than the surrounding surface, having withstood the abrasion of water.

The uplands covered as usual with mezquite, chimáza, ephydræ, the shrub with the edible nut, and cactus, of this a new and beau-

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tiful variety. In the cañon we heard in advance of us the crack of a rifle; on coming up we found that old Francisco, one of the guides, had killed a calf, left there, doubtless, by the Apaches.

The dry creek by which we crossed to the San Pedro river was the great highway leading from the mountain fastnesses into the plains of Santa Cruz, Santa Anna, and Tucsoon, frontier towns of Sonora. Along this valley was distinctly marked the same fresh trail, noted yesterday, of horses, cattle and mules.

The bed of this creek was deeply cut, and turned at sharp angles, forming a zigzag like the bayoux laid by sappers in approaching a fortress, each turn of which (and they were innumerable) formed a strong defensive position. The Apache once in possession of them is secure from pursuit or invasion from the Mexican.

Since the 1st November, we have been traversing, with incredible labor and great expenditure of mule power, the stronghold of these mountain robbers, having no other object in view than making our distance westward; yet here we are at this camp, only five seconds of time west of camp 89, at Disappointment creek, and one minute and four seconds west of our camp at the mouth of the San Francisco.

Nature has done her utmost to favor a condition of things which has enabled a savage and uncivilized tribe, armed with the bow and lance, to hold as tributary powers three fertile and once flourishing states, Chihuahua, Sonora, and Durango, peopled by a Christian race, countrymen of the immortal Cortez. These states were at one time flourishing, but such has been the devastation and alarm spread by these children of the mountains, that they are now losing population, commerce and manufactures at a rate which, if not soon arrested, must leave them uninhabited.

November 6.—For the double purpose of allowing the howitzers to come up, and to recruit our mules, it is decided this shall be a day of rest. The grama is good, but sparsely scattered over the hills, and it is necessary to loosen every animal and let them graze at will.

We are yet 500 miles from the nearest settlement, and no one surveying our cavalry at this moment would form notions favorable to the success of the expedition.

Except a few saddle mules, the private property of officers, which have been allowed to run loose, every animal in camp is covered with patches, scars, and sores, made by the packs in the unequal motion caused by the ascent and descent of steep hills.

The failure of the Apaches to bring in their mules, was a serious disappointment, and entirely justifies the name given to the creek, where they agreed to meet us. Besides, being the only means of transportation, they are, in extremity, to serve us as food, and the poor suffering creatures before us, give no very agreeable impression of the soup which their meat will furnish. However grave the subject may appear, it is the common source of merriment. All seem to anticipate it as a matter of course, and the constant recurrence of the mind to the idea, will no doubt accustom us to it, and make mule as acceptable as other soup.

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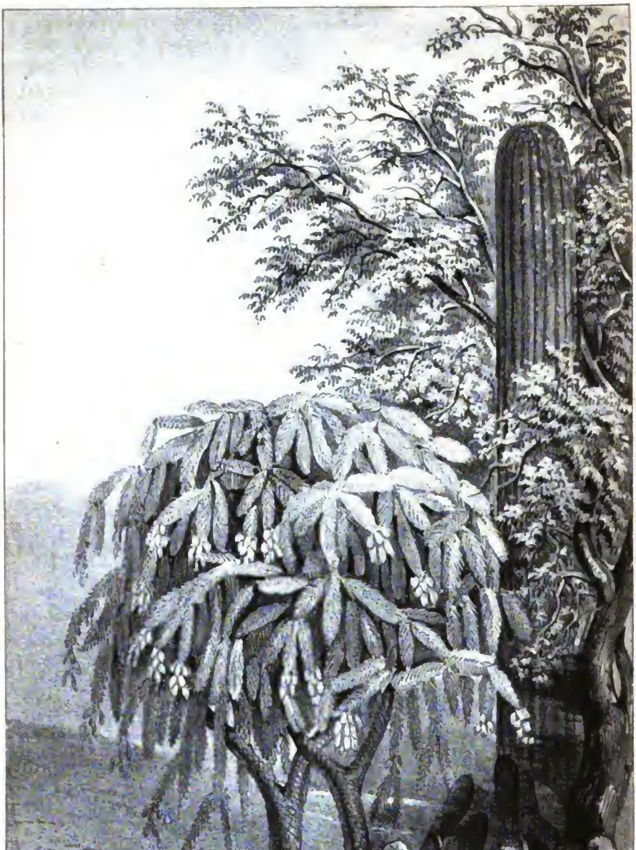

Graham, Lith

VEGITATION ON THE GILA

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In the sandy arroyos where our fires burn, that look as if they had been formed but a year or two since, was broken pottery, and the remains of a large building, similar in form, substance, and apparent antiquity to those so often described. Strolling over the hills alone, in pursuit of seed and geological specimens, my thoughts went back to the States, and when I turned from my momentary aberrations, I was struck most forcibly with the fact that not one object in the whole view, animal, vegetable, or mineral, had any thing in common with the products of any State in the Union, with the single exception of the cotton wood, which is found in the western States, and seems to grow wherever water flows from the vertebral range of mountains of North America; this tree we found growing near the summit of the Piñon Lano range of mountains, indeed, always where a ravine had its origin.

In one view could be seen clustered, the larrea Mexicana, the cactus, (king) cactus, (chandelier) green wood acacia, chamiza, prosopis odorata, and a new variety of sedge, and then large open spaces of bare gravel.

The only animals seen were lizzards, scorpions, and tarantulas.

I made elaborate observations for time and latitude, and for longitude by measurement of lunar distances. Anxious to observe eclipses of Jupiter's satellites, I determined once more to try the small telescope with which the satellites of Jupiter could just be discerned. I strained my eyes for two nights in succession to see if I could discover the moment of immersion and emersion of I and III satellites of Jupiter, which were visible from our camp. My efforts were fruitless, and the result to myself is a distressing nervous affection of the eye, which may injure the correctness of my other observations of this night.

The resulting latitude of the place is 32° 57′ ·43″.
longitude " ". 7*h*. 23*m*. 19*s*.
Rate of chronometer 2075, losing 12″ 7*s*. per day.
The height by barometer 2115 feet above the sea.
The latitude was deduced from 13 circum-meridian altitudes of beta aquarii, and 12 altitudes of polaris. The longitude from 8 distances between alpha arietis and the ☽, 9 of regulus and the ☽, and 5 of aldebaran and the ☽.

November 7.—About two miles from our camp the San Pedro joins the Gila just as the latter leaps from the mouth of the cañon. The place of meeting is a bottom three miles wide, seeming a continuation of that of the Gila.

It is principally of deep dust and sand, overgrown with cotton wood, mezquite, chamiza, willow, and the black willow. In places there are long sweeps of large paving pebbles, filled up with drift wood, giving the appearance of having been overflowed by an impetuous torrent. The hills on both sides of the river, still high, but now farther off, and covered to the top with soil producing the mezquite and pitahaya, as the day advanced, began to draw in closer, and before it closed, had again contracted the valley to a space little more than sufficient for the river to pass; and at halt, after

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making seventeen miles, we found ourselves encompassed by hills much diminished in height, but not in abruptness. The road, except the deep dust which occasionally gave way and lowered a mule to his knee, was good, that is, there were no hills to scale. The river was crossed and re-crossed four times. At 12 and 14 miles there were good patches of gramá, burned quite yellow, but for most of the way, and at our camp, there was little or no grass, and our mules were turned loose to pick what they could of rushes and willow along the margin of the stream.

Wherever the formation was exposed along the river, it was a conglomerate of sandstone, lime and pebbles, with deep caverns.

Nearly opposite our camp of this date, and about one-third the distance up the hill, there crops out ore of copper and iron, easily worked, the carbonate of lime and calcareous spar. A continuation of the vein of ore was found on the side where we encamped, and a large knoll strewed with what the Spaniards call guia, the English of which is "guide to gold."

The night has set in dark and stormy; the wind blows in gusts from the southwest, and the rain falling in good earnest, mingled with the rustling noise of the Gila, which has now become swift and impetuous, produces on us, who have so long been accustomed to a tranquil atmosphere, quite the impress of a tempest. We have been so long without rain as to cease to expect or make provision against it, and the consequence is the greatest difficulty in getting the men to provide coverings for the destructible portion of our rations.

Three Indians hailed us just before making camp, and after much parley were brought in. They feasted heartily, and promised to bring in mules. At first they denied having any; but after their appetites were satisfied, their hearts opened, and they sent the youngest of their party to their town, which was at the head of the dry creek of our camp, of the night before last. The fellow went on his way, as directed, till he met the howitzers, which so filled him with surprise and consternation that he forgot his mission, and followed the guns to camp in mute wonder. These people are of the Piñon Lano (piñon wood) tribe, and we had been told by the Pinoleros (pinole eaters) that the chief of this band had mules.

Flights of geese and myriads of the blue quail, and a flock of turkies, from which we got one.

The river bed, at the junction of the San Pedro, was seamed with tracks of deer and turkey; some signs of beaver and one trail of wild hogs.

Our camp was on a flat, sandy plain, of small extent, at the mouth of a dry creek, with deep washed banks, giving the appearance of containing at times a rapid and powerful stream, although no water was visible in the bed. At the junction, a clear, pure stream flowed from under the sand. From the many indications of gold and copper ore at this place, I have named it Mineral creek; and, I doubt not, a few years will see flat-boats descending the river from this point to its mouth, freighted with its precious ores.

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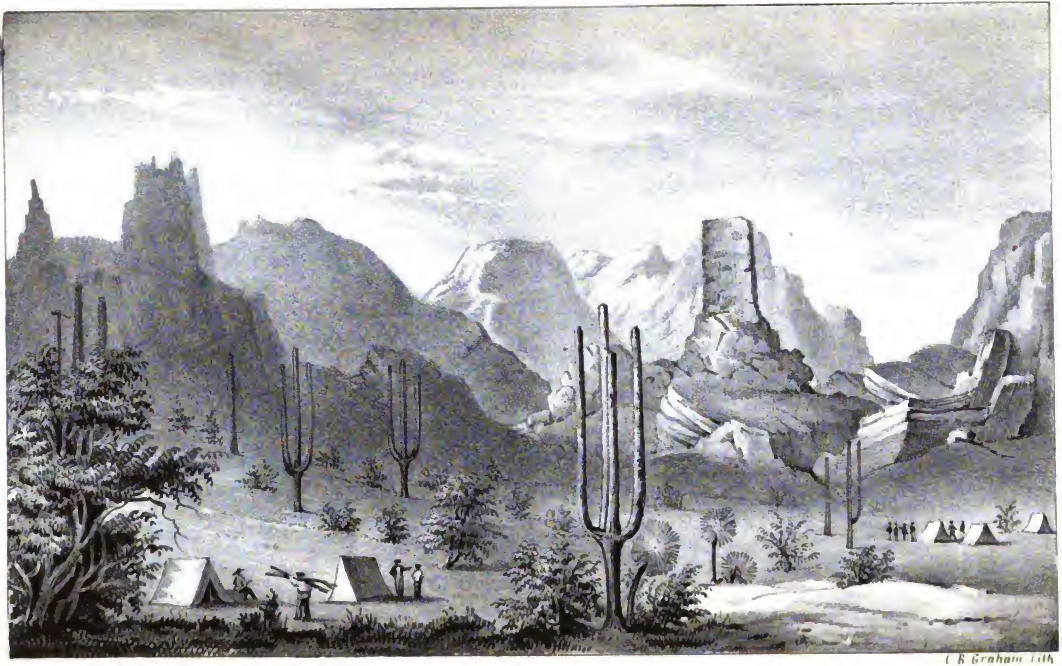

C. B. Graham lith

CHAIN OF NATURAL SPIRES ON THE GILA.

UNIV. OF MICH.

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There was a great deal of pottery about our camp, and just above us were the supposed remains of a large Indian settlement, differing very slightly from those already described.

November 8.—The whole day's journey was through a cañon, and the river was crossed twelve or fifteen times. The sand was deep, and occasionally the trail much obstructed by pebbles of paving-stone. The willow grew so densely in many places as to stop our progress, and oblige us to look for spots less thickly overgrown, through which we could break.

The precipices on each side were steep; the rock was mostly granite and a compact sandy limestone, with occasional seams of basalt and trap; and towards the end of the day, calcareous sand stone, and a conglomerate of sandstone, feldspar, fragments of basalt, pebbles, &c. The stratification was very confused and irregular, sometimes perfectly vertical but mostly dipping to the southwest, at an angle of 30°. Vast boulders of pure quartz; the river, in places, was paved with them.

About two miles from camp, our course was traversed by a seam of yellowish colored igneous rock, shooting up into irregular spires and turrets, one or two thousand feet in height. It ran at right angles to the river, and extended to the north, and to the south, in a chain of mountains as far as the eye could reach. One of these towers was capped with a substance, many hundred feet thick, disposed in horizontal strata of different colors, from deep red to light yellow. Partially disintegrated, and laying at the foot of the chain of spires, was a yellowish calcareous sandstone, altered by fire, in large amorphous masses.

For a better description of this landscape, see the sketch by Mr. Stanly.

To the west, about a mile below us, and running parallel to the first, is another similar seam, cut through by the Gila, at a great butte, shaped like a house. The top of this butte appears to have once formed the table land, and is still covered with vegetation. Through both these barriers the river has been conducted by some other means than attrition. Where it passes the first, it presents the appearance of a vast wall torn down by blows of a trip hammer. Under to-day's date, in appendix No. 2, will be found many interesting plants, but the principal growth was as usual, Pitahaya, acacia, prosopis, Fremontia, and obione canescens.

The latitude of this camp, which is within a mile of the spot where we take a final leave of the mountains, is, by the mean of the observations on north and south stars, polaris and beta aquarii, 33° 05′ 40″; its longitude, derived by measurement and also by the chronometric difference of meridian between this and the camp of November 5th, is 111° 13′ 10″ west of Greenwich, and the height of the river at this point above the sea, as indicated by the barometer, 1,751 feet.

At night, for the first time since leaving Pawnee Fork, I was interrupted for a moment in my observations, by moisture collecting on the glass of my horizon shade, showing a degree of humidity in

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by layers of mud, two feet thick. Stanly made an elaborate sketch of every part; for it was, no doubt, built by the same race that had once so thickly peopled this territory, and left behind the ruins.

We made a long and careful search for some specimens of household furniture, or implement of art, but nothing was found except the corngrinder, always met with among the ruins and on the plains. The marine shell, cut into various ornaments, was also found here, which showed that these people either came from the sea coast or trafficked there. No traces of hewn timber were discovered; on the contrary, the sleepers of the ground floor were round and unhewn. They were burnt out of their seats in the wall to the depth of six inches. The whole interior of the house had been burnt out, and the walls much defaced. What was left bore marks of having been glazed, and on the wall in the north room of the second story were traced the following hieroglyphics.

Where we encamped, eight or nine miles from the Pimos village, we met a Maricopo Indian, looking for his cattle. The frank, confident manner in which he approached us was in strange contrast with that of the suspicious Apache. Soon six or eight of the Pimos came in at full speed. Their object was, to ascertain who we were, and what we wanted. They told us the fresh trail we aw up the river was that of their people, sent to watch the movements of their enemies, the Apaches. Being young, they became much alarmed on seeing us, and returned to the town, giving the alarm that a large body of Apaches were approaching.

Their joy was unaffected at seeing we were Americans, and not Apaches. The chief of the guard at once despatched news to his chief, of the result of his reconnoissance. The town was nine miles distant, yet, in three hours, our camp was filled with Pimos loaded with corn, beans, honey, and zandias (water melons.) A brisk trade was at once opened. This was my *observing* night; but the crowd of Indians was great, and the passing and repassing, at full speed so continuous, that I got an indifferent set of observations.

The camp of my party was pitched on the side nearest the town, and we saw the first of these people and their mode of approach. It was perfectly frank and unsuspicious. Many would leave their packs in our camp and be absent for hours, theft seeming to be unknown among them. With the mounted guard, which first visited us, was a man on foot, and he appeared to keep pace with the fleetest horse. He was a little out of breath when he reached us, but soon recovering, told us he was the interpreter to Juan Antonio Llunas, chief of the Pimos.

We were taking some refreshments at the time, and invited him to taste of them. The effect was electric; it made his bright, intelligent eye flash, and loosened his tongue. I asked him, among other things, the origin of the ruins of which we had seen so many; he said, all he knew, was a tradition amongst them, that in bygone days, a woman of surpassing beauty resided in a green spot in the mountains near the place where we were encamped. All the men admired, and paid court to her. She received the tributes of their devotion, grain, skins, &c., but gave no love or other favor in return.

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C. B. Graham, Lith.

RUINS OF THE CASA GRANDE

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THE INTERPRETER OF THE PIMOS.
BY BIRTH A COCO MARICOPAS.

C. B. Graham, Lith.

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Her virtue, and her determination to remain unmarried were equally firm. There came a drought which threatened the world with famine. In their distress, people applied to her, and she gave corn from her stock, and the supply seemed to be endless. Her goodness was unbounded. One day, as she was lying asleep with her body exposed, a drop of rain fell on her stomach, which produced conception. A son was the issue, who was the founder of a new race which built all these houses.

I told the interpreter repeatedly, he must go and report to the general, but his answer was, "let me wait till I blow a little." The attraction was the aquardente. At length he was prevailed on to go to head-quarters, leaving at our camp his bows and arrows and other matters, saying he would return and pass the night with us.

November 11.—Leaving the column, a few of us struck to the north side of the river, guided by my loqacious friend, the interpreter, to visit the ruins of another Casa Montezuma. In the course of the ride, I asked him if he believed the fable he had related to me last night, which assigned an origin to these buildings. "No," said he, "but most of the Pimos do. We know, in truth, nothing of their origin. It is all enveloped in mystery."

The casa was in complete ruins, one pile of broken pottery and foundation stone of the black basalt, making a mound about ten feet above the ground. The outline of the ground plan was distinct enough.

We found the description of pottery the same as ever; and, among the ruins, the same sea shell; one worked into ornaments; also a large bead, an inch and a quarter in length, of bluish marble, exquisitely turned.

We secured to-day our long sought bird, the inhabitant of the mezquite, indigo blue plumage, with top knot and long tail. Its wings, when spread, showing a white ellipse.

Turning from the ruins towards the Pimos village, we urged our guide to go fast, as we wished to see as much of his people as the day would permit. He was on foot, but led at a pace which kept our mules in a trot.

We came in at the back of the settlement of Pimos Indians, and found our troops encamped in a corn field, from which the grain had been gathered. We were at once impressed with the beauty, order, and disposition of the arrangements for irrigating and draining the land. Corn, wheat, and cotton are the crops of this peaceful and intelligent race of people. All the crops have been gathered in, and the stubbles show they have been luxuriant. The cotton has been picked, and stacked for drying on the tops of sheds. The fields are sub-divided, by ridges of earth, into rectangles of about 200 × 100 feet for the convenience of irrigating. The fences are of sticks, wattled with willow and mezquite, and, in this particular, set an example of economy in agriculture worthy to be followed by the Mexicans, who never use fences at all. The houses of the people are mere sheds, thatched with willow and corn stalks.

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With the exception of the chief, Antonio Llunas, who was clad in cast off Mexican toggery, the dress of the men consisted of a cotton serape of domestic manufacture, and a breech cloth. Their hair was very long, and clubbed up. The women wore nothing but the serape pinned about the loins, after the fashion of Persico's Indian woman on the east side of the Capitol, though not quite so low.

The camp was soon filled with men, women, and children, each with a basket of corn, frijolés, or meal, for traffic. Many had jars of the molasses expressed from the fruit of the pitahaya. Beads, red cloth, white domestic, and blankets, were the articles demanded in exchange. Major Swords, who had charge of the trading duty, pitched a temporary awning, under which to conduct the business, which had scarcely commenced before this place formed a perfect menagerie, into which crowded, with eager eyes, Pimos, Maricopas, Mexicans, French, Dutch, English, and Americans. As I passed on to take a peep at the scene, naked arms, hands, and legs protruded from the awning. Inside there was no room for bodies, but many heads had clustered into a very small space, filled with different tongues and nations. The trade went merrily on, and the conclusion of each bargain was announced by a grunt and a joke, sometimes at the expense of the quartermaster, but oftener at that of the Pimos.

November 12.—We procured a sufficiency of corn, wheat, and beans from the Pimos, but only two or three bullocks, and neither horses nor mules. They have but few cattle, which are used in tillage, and apparently all steers, procured from the Mexicans. Their horses and mules were not plenty, and those they possessed were prized extravagantly high. One dashing young fellow, with ivory teeth and flowing hair, was seen coming into our camp at full speed, on a wild unruly horse, that flew from side to side as he approached, alarmed at the novel apparition of our people. The Maricopa, for he was of that tribe, was without saddle or stirrups, and balanced himself to the right and left with such ease and grace as to appear part of his horse. He succeeded in bringing his fiery nag into the heart of the camp. He was immediately offered a very advantageous trade by some young officer. He stretched himself on his horse's neck, caressed it tenderly, at the same time shutting his eyes, meaning thereby that no offer could tempt him to part with his charger.

The general gave a letter to Governor Llunas, stating he was a good man, and directing all United States troops that might pass in his rear, to respect his excellency, his people, and their property. Several broken down mules were left with him to recruit, for the benefit of Cook's battalion as it passed along.

To us it was a rare sight to be thrown in the midst of a large nation of what is termed wild Indians, surpassing many of the christian nations in agriculture, little behind them in the useful arts, and immeasurably before them in honesty and virtue. During the whole of yesterday, our camp was full of men, women, and

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JUAN ANTONIO — POMO HEAD CHIEF

C. E. Graham Lith.

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children, who sauntered amongst our packs, unwatched, and not a single instance of theft was reported.

I rode leisurely in the rear, through the thatched huts of the Pimos; each abode consists of a dome-shaped wicker-work, about six feet high, and from twenty to fifty feet in diameter, thatched with straw or cornstalks. In front is usually a large arbor, on top of which is piled the cotton in the pod, for drying.

In the houses were stowed watermelons, pumpkins, beans, corn, and wheat, the three last articles generally in large baskets; sometimes the corn was in baskets covered with earth, and placed on the tops of the domes. A few chickens and dogs were seen, but no other domestic animals, except horses, mules, and oxen. Their implements of husbandry were the axe (of steel,) wooden hoes, shovels, and harrows. The soil is so easily pulverized as to make the plough unnecessary.

Several acquaintances, formed in our camp yesterday, were recognized, and they received me cordially, made signs to dismount, and when I did so, offered watermelons and pinole. Pinole is the heart of Indian corn, baked, ground up, and mixed with sugar. When dissolved in water, it affords a delicious beverage, it quenches thirst, and is very nutritious. Their molasses, put up in large jars, hermetically sealed, of which they had quantities, is expressed from the fruit of the pitahaya.

A woman was seated on the ground under the shade of one of the cotton sheds. Her left leg was tucked under her seat and her foot turned sole upwards; between her big toe and the next, was a spindle about 18 inches long, with a single fly of four or six inches. Ever and anon she gave it a twist in a dexterous manner, and at its end was drawn a coarse cotton thread. This was their spinning jenny. Led on by this primitive display, I asked for their loom by pointing to the thread and then to the blanket girded about the woman's loins. A fellow stretched in the dust sunning himself, rose up leisurely and untied a bundle which I had supposed to be a bow and arrow. This little package, with four stakes in the ground, was the loom. He stretched his cloth and commenced the process of weaving.

We travelled 15½ miles and encamped on the dividing ground between the Pimos and Maricopas. For the whole distance, we passed through cultivated grounds, over a luxuriantly rich soil. The plain appeared to extend in every direction 15 or 20 miles, except in one place about five miles before reaching camp, where a low chain of hills comes in from the southeast, and terminates some miles from the river. The bed of the Gila, opposite the village, is said to be dry; the whole water being drawn off by the zequias of the Pimos for irrigation; but their ditches are larger than is necessary for this purpose, and the water which is not used returns to the bed of the river with little apparent diminution in its volume.

Looking from our camp north, 30 west, you see a great plain with mountains rising in the distance on each side. This prospect had induced some travellers to venture from here in a direct line to

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Monterey in California, but there is neither grass nor water on that passage, and thirst and distress overcame, undoubtedly, those who attempted it.

In almost an opposite direction north, 50 east, there is a gap in the mountains through which the Salt river flows to meet the Gila, making with it an acute angle, at a point ten or fifteen miles distant from our camp, bearing northwest. A little north of east, another gap, twenty or thirty miles distant, shows where the Rio San Francisco flows into the Salt river. From the best information I can collect, the San Francisco comes in from the north; its valley is narrow and much cañoned; good grass abounds all the way. Le Vonoceur, one of my party, came down that river in 1844 with a trapping party of forty-eight men. He states that they were much annoyed the whole way by the Apache Indians, a great many of whom reside on that river. Every night they were fired upon, and an attempt made to stampede their mules. Many traps were stolen, and one of their party, an old man, who had been in the mountains forty-five years, was killed by the Indians in this expedition.

Near the junction of the Gila and Salt rivers, there is a chain of low serrated hills coming in from both sides, contracting the valley considerably. Around the South Spur the Gila turns, making its course in a more southerly direction. To the east, except where the spurs already mentioned protrude, the plain extends as far as the eye can reach. A great deal of the land is cultivated, but there is still a vast portion within the level of the Gila that is yet to be put under tillage. The population of the Pimos and Maricopas together is estimated variously at from three to ten thousand. The first is evidently too low.

This peaceful and industrious race are in possession of a beautiful and fertile basin. Living remote from the civilized world, they are seldom visited by whites, and then only by those in distress, to whom they generously furnish horses and food. Aguardiente (brandy) is known among their chief men only, and the abuse of this, and the vices which it entails, are yet unknown.

They are without other religion than a belief in one great and over-ruling spirit.

Their peaceful disposition is not the result of incapacity for war, for they are at all times enabled to meet and vanquish the Apaches in battle, and when we passed, they had just returned from an expedition in the Apache country to revenge some thefts and other outrages, with eleven scalps and thirteen prisoners. The prisoners are sold as slaves to the Mexicans.

The Maricopas occupy that part of the basin lying between camp 97 and the mouth of the Salt river, and all that has been said of the Pimos, is applicable to them. They live in cordial amity, and their habits, agriculture, religion, and manufactures, are the same. In stature, they are taller; their noses are more aquiline, and they have a much readier manner of speaking and acting. I noticed that most of the interpreters of the Pimos were of this tribe, and also the men we met with in the spy guard.

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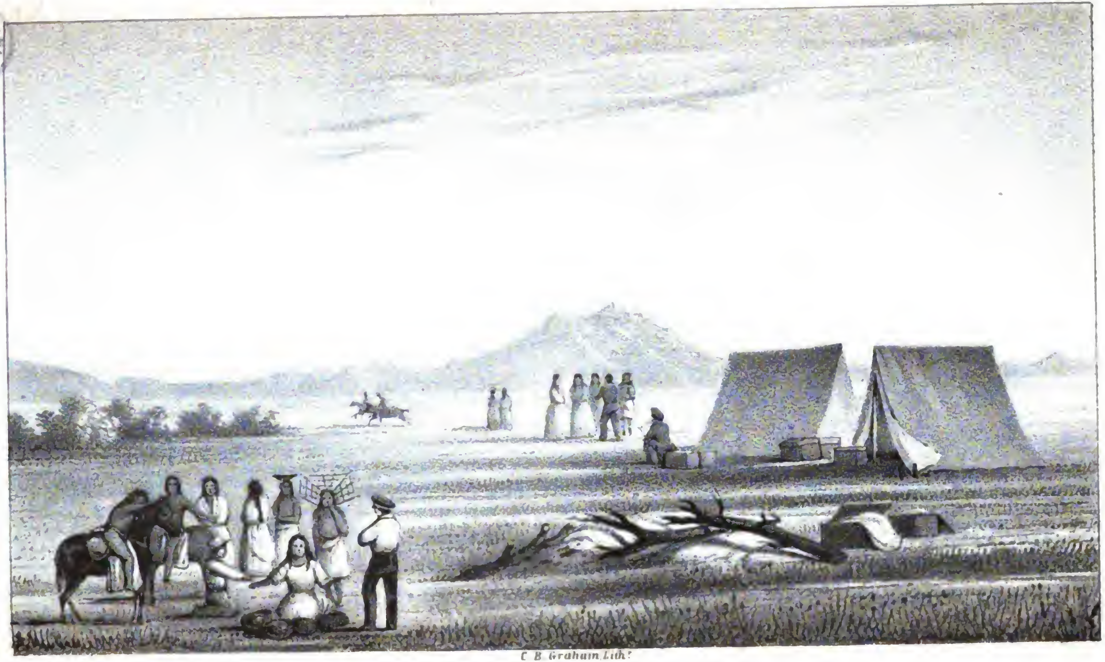
C. B. Graham, Lith.

PIMOS & COCO MARICOPAS INDIANS

UNIV. OF MICH.

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Though fewer in number, they appear to be superior in intelligence and personal appearance.

Don Jose Messio is their governor, and, like the governor of the Pimos, holds his office by the appointment of the Mexican governor of California. The people have no choice in the selection. Both these Indians are respectable looking old men, and seem to be really worthy of the trust reposed in them.

We had not been long in camp before a dense column of dust down the river announced the approach of the Maricopas, some on foot, but mostly on horseback. They came into camp at full speed, unarmed, and in the most confident manner, bringing water melons, meal, pinole, and salt, for trade. The salt is taken from the plains; wherever there are bottoms which have no natural drainage, the salt effloresces and is skimmed from the surface of the earth. It was brought to us, both in the crystallized form, and in the form when first collected, mixed with earth.

My camp was selected on the side towards the village, and the constant galloping of horses rendered it difficult for me to take satisfactory observations, which I was desirous of doing, as it is an important station. When I placed my horizon on the ground, I found that the galloping of a horse five hundred yards off affected the mercury, and prevented a perfectly reflected image of the stars, and it was in vain to hope for these restless Maricopas to keep quiet. News got about of my dealings with the stars, and my camp was crowded the whole time.

The latitude of this camp by such observations as the Maricopas would allow me to make, was 33° 09′ 28″, and the longitude 112° 07′ 13″.

November 13 and 14.—With the morning came the Maricopas women, dressed like the Pimos. They are somewhat taller, and one peculiarity struck me forcibly, that while the men had aquiline noses, those of the women were *retroussés*. Finding the trade in meal had ceased, they collected in squads about the different fires, and made the air ring with their jokes and merry peals of laughter. Mr. Bestor's spectacles were a great source of merriment. Some of them formed the idea that with their aid, he could see through their cotton blankets. They would shrink and hide behind each other at his approach. At length, I placed the spectacles on the nose of an old woman, who became acquainted with their use and explained it to the others.

We were notified that a long journey was to be made without finding water, (to cut off an elbow in the river,) and the demand for gourds was much greater than the supply. One large gourd cost me four strings of glass beads, which was thought a high price. The interpreter who guided us to the Casa Montezuma, on the north side of the Gila, said that on the Salt river, about a day's journey and a half, there was one of those buildings standing, complete in all respects except the floors and roof. He said it was very large, with beautiful glazed walls; that the footsteps of the men employed in building the house could yet be seen in the adobe, and that the impression was that of a naked foot. Whenever a rain comes, the

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Indians resort to these old houses to look for trinkets of shells, and a peculiar green stone which I think is nothing more than verde antique.

At 12 o'clock, after giving our horses a last watering, we started off in a southwestern direction to turn the southern foot of the range of hills pointing to the Salt river. Five miles brought us into a grove of the pitahaya, which had yielded a plentiful supply of fruit to the Indians. Our way was over a plain of granitic sand, ascending gradually and almost imperceptibly. After leaving the pitahaya, there was no growth except the larrea Mexicana, and occasionally, at long intervals, an acacia or inga.

We travelled till long after dark, and dropped down in a dust hole near two large green-barked acacias. There was not a sprig of grass or a drop of water, and during the whole night the mules kept up a piteous cry for both.

There was nothing but the offensive larrea, which even mules will not touch, when so hungry as to eat with avidity the dry twigs of all other shrubs and trees. As soon as the moon rose, at 3, a. m., the bugle sounded to horse, and we were up and pursuing our way. A little after sunrise, we had passed the summit and were descending towards the Gila. This summit was formed by a range of granite hills running southeast, and standing in pinnacles.

As the sun mounted, the mirage only seen once before since leaving the plains of the Arkansas, now began to distort the distant mountains, which everywhere bounded the horizon, into many fantastic shapes. The morning was sharp and bracing, and I was excessively hungry, having given my breakfast, consisting of two biscuits, to my still more hungry mule. I was describing to Mr. Warner how much more pleasant it would be to be jogging into Washington after a fox hunt, with the prospect of a hot breakfast, when up rose to our astonished view, on the north side of the Gila, a perfect representation of the capitol, with dome, wings, and portico, all complete. It remained for full twenty minutes with its proportions and outline perfect, when it dwindled down into a distant butte.

We went on briskly to the Gila, whose course, marked by the green cotton wood, could be easily traced. It looked much nearer than it really was. We reached it after making forty miles from our camp of yesterday.

Our poor brutes were so hungry they would drink no water, but fell to work on the young willows and cane. After letting them bite a few minutes, we moved down the river five miles farther, to a large and luxuriant patch of paspalum grass, shaded by the acacia and prosopis.

My eyes becoming sore with dust, I took a large object for my southern star to-night, the planet saturn. 16 circum-meridian altitudes of saturn and 9 altitudes of polaris give the latitude of the camp 35° 59′ 22″, and the longitude given by the chronometer is 112° 50′ 01″.

November 15.—In the morning the general found the mules so much worsted by the 45 miles journey without food or water, that

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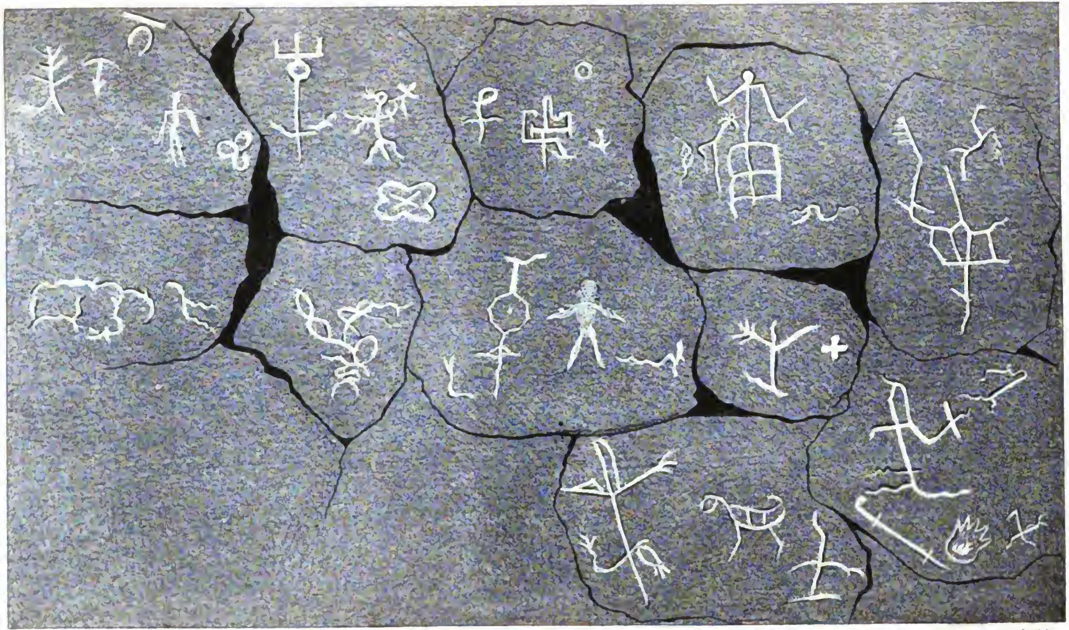

C R Graham, Lith[r]

UNIV. OF

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he determined to remain for the day. Most of the mules belonging to my party have travelled 1800 miles, almost continuously. Two or three times they have all appeared on the eve of death; but a mule's vitality seems to recuperate, when life seems to be almost extinct, so I am in hopes the day's rest will revive them sufficiently to enable them to undertake what will be the most distressing part of the journey. From information collected from the Indians and others, it appears that we shall meet with no more grass from this spot to the settlements, estimated 300 miles distant.

This has been a gloomy day in the dragoon camp. The jornada cost them six or eight mules, and those which have survived give little promise of future service. The howitzers make severe draughts on them. Yesterday, within five miles of the river, Lieutenant Davidson was obliged to hitch his private mules to them. An order has been given to-day to dismount one-half the command and reserve the animals for packing.

From all accounts there is no difficulty in following the route of the river from camp 97 to this place, and the journey is but a trifle longer; I would, therefore, recommend parties in our rear to get a Coco Maricopa guide and keep the river.

Remains of an old zequia, and the plains covered with broken pottery. About us there are signs of modern Indian tenements, and the zequia may possibly have been the work of their hands. We know the Maricopas have moved gradually from the gulf of California to their present location in juxta position with the Pimos. Carson found them, so late as the year 1826, at the mouth of the Gila; and Dr. Anderson, who passed from Sonora to California in 1828, found them, as near as we could reckon from his notes, about the place we are now encamped in. The shells found to-day were, in my opinion, evidently brought by the Maricopas from the sea. They differ from those we found among the ruins.

Observed for time to-night and obtained the rates of my chronometers; that of chronometer No. 783, 12*s*. per day, showing a very satisfactory consistency in rate since leaving the mountains.

November 16.—The valley on the south side continues wide, and shows continuously the marks of former cultivation. On the north side the hills run close to the river.

After making ten miles we came to a dry creek, coming from a plain reaching far to the south, and then we mounted the table lands to avoid a bend in the river, made by a low chain of black hills coming in from the southeast. The table land was strewed with fragments of black basalt, interspersed with agate, chalcedony, vitrified quartz, and carbonate of lime. About the summit was a mound of granite boulders, blackened by augite, and covered with unknown characters; the work of human hands. These have been copied. On the ground near by were also traces of some of the figures showing some of the hieroglyphics, at least, to have been the work of modern Indians. Others were of undoubted antiquity, and the signs and symbols intended doubtless, to commemorate some great event. One stone bore on it what might be taken, with a little stretch of the imagination, to be a mastadon, a horse, a dog,

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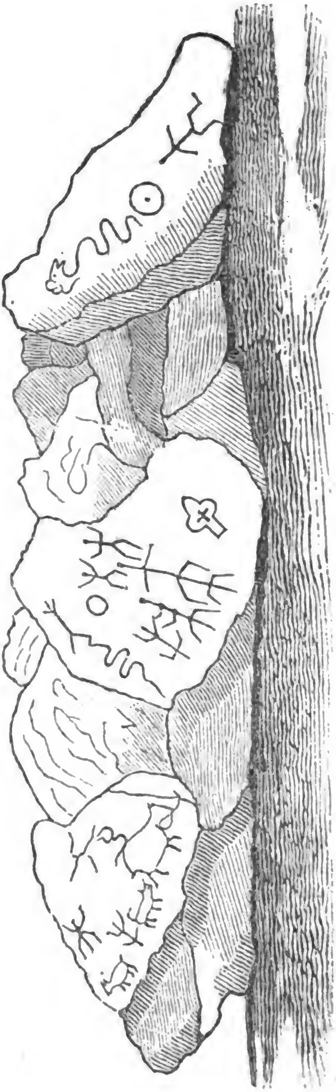
and a man. Their heads are turned to the east, and this may commemorate the passage of the Aborigines of the Gila on their way south.



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Many of the modern symbols are in imitation of the antique, and, doubtless, the medicine men of the present day resort to this mound to invoke their unseen spirits, and work the miracles which enable them to hold their sway amongst their credulous race. There are many more weird and mysterious looking places than this to be found along the banks of the Gila, and the first attraction to the modern Indian was, without doubt, the strange characters he saw inscribed.

Some of the boulders appear to have been written and re-written upon so often it was impossible to get a distinct outline of any of the characters.

We descended into the broad valley of the Gila, skirted on the south side of the table land, black with basalt pebbles, resting on a stratum of the carbonate of lime upon which the river impinged at every flood, and widened its valley.

The hills on the north side were of red and grey rocks, probably granite, irregular in form, varying from 500 to 1,000 feet. Finding no grass, we loosened our mules among the willows and cane.

November 17.—The route to-day was over a country much the same as that described yesterday. Wherever we mounted to the table lands to cut off a bend in the river, found them dreary beyond description, covered with blocks of basalt, with a few intervals of dwarf growth of larrea. Now and then a single acacia raised its solitary form and displayed its verdure in the black expanse. We crossed the dry beds of two creeks with sandy bottoms. Under the crust of basalt are usually sand-stone and a conglomerate of pebbles, sand-stone, and lime. This last is easily undermined by the river, and the basalt or lava then caves in.

The bottoms of the river are wide, rich, and thickly overgrown with willow and a tall aromatic weed, and alive with flights of white brant, (wing tipped with black,) geese, and ducks, with many signs of deer and beaver.

At night I heard the song of the sailors calling the depth of the water, and presently, Williams, Lieutenant Warner's servant, who had been missing all day, came out of the river with the hind quarters of a large buck, perfectly intoxicated with his unexpected success. Twelve miles back, he let his mule loose, went in pursuit of deer, and killed a buck. After lugging the whole of it for two miles, he lightened his load by leaving one-half.

We encamped down in one of the deserted beds of the Gila, where the ground was cracked and drawn into blisters. The night was cold, the thermometer at 6, a. m., 20°.

Latitude of the camp 32° 55′ 52″. Longitude of the camp 113° 25′ 25″.

November 18.—High wind from the northwest all day, showing that there was still a barrier of snow-clad mountains between ourselves and Monterey, which we must turn or scale.

Carson pointed to a flat rock covered with fur, and told that he had slaughtered a fat mule there. The names of several Americans were inscribed on the same rock.

After travelling some ten or twelve miles through the valley, we

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mounted to the table land, and at 12½ o'clock stopped to graze our horses at a little patch of dried spear grass. Leaving this, the ground, as far as the eye could reach, was strewed with the black, shining, well rounded pebbles. The larrea even was scarcely seen, and dreariness seemed to mantle the earth. The arroyo by which we descended to the river was cut from a bed of reddish pebbles 20 or 30 feet deep, and as we neared the river they were soldered together in a conglomerate of which lime was the cement.

We saw to-day on the rocks, other rude carvings of the Indians, but their modern date was apparent.

To-day there was a dead calm, about meridian intensely hot, and the dust rose in volumes as our party advanced.

We found the river spread over a greater surface, about 100 yards wide, and flowing gently along over a sandy bottom, the banks fringed with cane, willow, and myrtle.

Last night I took an involuntary plunge into it, for my mule sunk in a quick sand, while I was searching for a place to cross my party. To-night I took a swim, but found the waters disagreeably cold.

The chain of broken hills still continued on the north side, and when near our camp of this date, circled in an amphitheatre, with its arch to the north. The basaltic columns, rising into the shape of spires, domes, and towers, gave it the apperance, as we approached, of a vast city on the hills. The distance of the crown of this amphitheatre, determined by angulation, is —— miles, and Francisco informs me, that against its north base the Colorado strikes. So at this point, which is about six miles below our camp of this date, the Gila and Colorado must be near together. The hills and mountains appeared entirely destitute of vegetation, and on the plains could be seen, only at long intervals, a few stunted tufts of larrea Mexicana, and wild wormwood, artemisia cana.

November 19.—The table lands were the same as those described yesterday, but the valley widens gradually, and for most of the way is six or eight miles wide, and the soil excellent. Some remains of former settlements in broken pottery, corn grinders, &c.; but much fewer in number than above. Nine miles from camp a spur of mountains of an altered silicious sand-stone came in from the southeast, sharp as the edge of a case knife, and shooting into pinnacles. At their base we passed for half a mile over the sharp edges of a red altered sandstone, dipping southwest about 80°, indeed nearly vertical.

On this spur was killed a mountain sheep, one of a large flock, from which we named it Goat's spur. We encamped on an island where the valley is contracted by sand buttes in what had been very recently the bed of the river. It was overgrown with willow, cane, Gila grass, flag grass, &c. The pools in the old bed of the river were full of ducks, and all night the swan, brant, and geese, were passing, but they were as shy as if they had received their tuition on the Chesapeake bay, where they are continually chased by sportsmen. The whole island was tremulous

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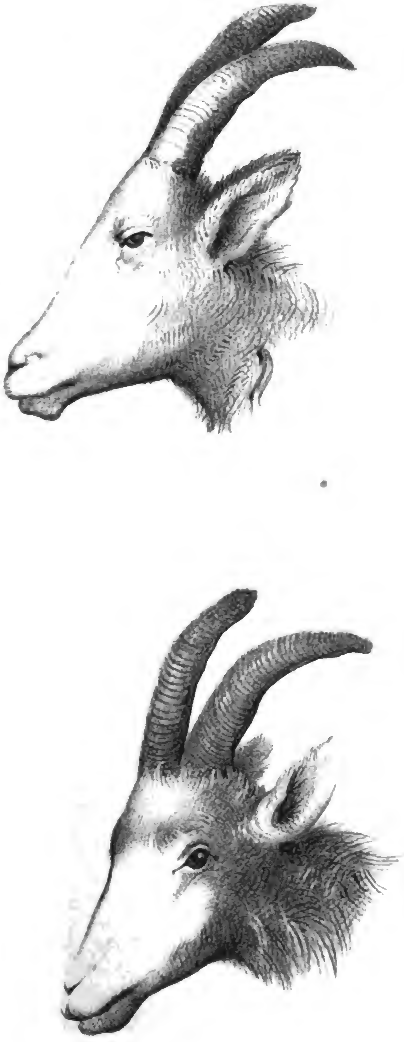

HEAD OF THE MOUNTAIN GOAT.

C. B Graham, Lith'

UNIV OF MICH.

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with the motion of the mules grazing, and my observations were, therefore, not very satisfactory.

11 circum-meridian altitudes of procyon, and 12 altitudes of polaris, give the latitude of the camp, 32° 43′ 38″.

November 20.—The table lands were of sand, and the bottom of the river constantly received deposites from them, which changed its bed frequently, as might be seen from the different growths of cotton wood marking the old land. Our road, about five miles from last night's camp, was traversed by a spur of coarse grained granite underlaid by old red sandstone dipping some 80° to the south and west. The direction of the spur was nearly parallel to those before noted, northwest and southeast, which is the direction of the axis of the maximum elevation of most of the mountains traversing the course of the Gila.

Our camp was pitched on a little patch of grass two miles from the river, night came on before the horses reached it, and they were without water for twenty-four hours; there was a pond near the camp, but so salt that the horses could not drink it.

At noon, the thermometer was 74°, at 6, p. m., 52°, and at 6 o'clock the next morning, 19°, which has been about the average range of temperature for the last two weeks.

November 21.—To-day we marched only eight and a half miles, and halted for a patch of grama, which was an agreeable and beneficial change to our mules, that had been living on cane and willow for some days past.

The plains are now almost entirely of sand, and composed of sandy and calcareous loam with iron pyrites and common salt, covered sparsely with chamiza, larrea Mexicana, and a shrubby species of sage, (salvia.)

I observed at night for latitude and time, and there being two occultations of Jupiter's satellites, I was tempted to observe them with our inferior telescope, which only gave us another proof of its uselessness for the purpose.

November 22.—Mr. Warner and I started before the advance sounded, and climbed the sharp spur of a continuous comb of mountains coming from the southeast, to try if we could see the Colorado of the west. The mountains rose abruptly from the plains as they mostly do in this region, resembling in appearance large dykes terminating at top in a sharp ridge which a man could, at any part, straddle. They were of hard granite, pepper and salt colored, traversed by seams of white quartz. This spur gives the river Gila quite a bend to the north, and from that point to its mouth, which we reached at night, the river is straight in its general direction; but its course is crooked and dotted with sandbars, by incursions from the sandhills which now flank both its sides. The sand is brought down by the winds from the valley of the Colorado. Its volume seemed, I think, a little diminished, probably absorbed by the sand.

The day was warm, the dust oppressive, and the march, twenty-two miles, very long for our jaded and ill-fed brutes. The general's horse gave out, and he was obliged to mount his mule.

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Most of the men were on foot, and a small party, composed chiefly of the general and staff, were a long way ahead of the straggling column, when, as we approached the end of our day's journey, every man was straightened in his saddle by our suddenly falling on a camp which, from the trail, we estimated at 1,000 men, who must have left that morning. Speculation was rife, but we all soon settled down to the opinion that it was General Castro and his troops; that he had succeeded in recruiting an army in Sonora, and was now on his return to California. Carson expressed the belief that he must be only ten miles below, at the crossing. Our force consisted only of 110 men. The general decided we were too few to be attacked, and must be the aggressive party, and if Castro's camp could be found, that he would attack it the moment night set in, and beat them before it was light enough to discover our force.

The position of our camp was decided, as usual, with reference to the grass. The lives of our animals were nearly as important as our own.. It was pitched to-day in a little hollow encircled by a chain of sand hills, overgrown with mezquite.

The sergeant of the general's guard was behind, his mule having broken down, and when he came in reported having seen two Indians about five miles back. For a short time we supposed this immense trail was a band of Indians returning from a successful marauding expedition in Sonora or California; but this conjecture was soon dispelled by the appearance of a mounted Mexican on a sand butte overlooking our camp, who, after taking a deliberate survey, disappeared. The camp was arranged immediately for defence, and a cordon of sentinels stationed on the sand hills.

The two howitzers did not arrive till nine o'clock, and the officer in charge, Lieutenant Hammond, reported he had seen large fires to the right, apparently five miles dictant, on the opposite side of the Gila.

The general said it was necessary for him to know who occupied the camp, its force, character, and destination.

He ordered me to take my party and fifteen dragoons, for the purpose of reconnoitering. After beating about in the mezquite for some time, we struck a slough of the Gila, where grew some tall willows. Up one of these I sent a dragoon, who saw no fire, but whose ears were gladdened by the neighing of horses. He slipped down the tree much faster than he climbed it, quite enchanted with the hope of exchanging his weary mule for a charger. Instead of reporting what he had seen, he exclaimed, "Yes, sir, there are enough for us all." "Did you see the fires?" "No! but they are all on horses; I heard them neighing, and they cover much ground." He pointed in the direction, and after proceeding a short distance, we all heard distinctly the noise of the horses, indicating a large number.

Silence was enjoined, and we proceeded stealthily along for some time, when a bright fire blazed before us. I halted the guard, and with two dragoons, Londeau and Martinez, proceeded unobserved until within a few feet of the fire. Before it stood an armed Mex-

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C.B. Graham, Lith.

JUNCTION OF THE GILA & COLORADO RIVERS

UNIV. OF MICH.

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ican. I sent Londeau and Martinez with orders to assume the occupation of trappers, and ascertain whom, and what, the man guarded. The conference was short; other Mexicans advanced, and I sent in man for man. It was not Castro, as we expected, but a party of Mexicans with 500 horses from California, on their way to Sonora for the benefit of Castro.

I took the four principal men to the general, and left a guard to watch the camp and see that no attempt was made to escape. The men were examined separately, and each gave a different account of the ownership and destination of the horses.

The chief of the party, a tall, venerable looking man, represented himself to be a poor employé of several rich men engaged in supplying the Sonora market with horses. We subsequently learned that he was no less a personage than Jose Maria Leguna, a colonel in the Mexican service.

November 23.—We did not move camp to-day, in order to make a refit from last night's capture, and give our mules an opportunity to pick what little grass they could before taking the desert of 90 miles, which lies on the other side of the Colorado, and between us and water.

Warner, Stanley, and myself, saddled up to visit the junction of the Gila and Colorado, which we found due north from our camp, and about a mile and a half distant. The day was stormy, the wind blowing fiercely from the north. We mounted a butte of feldspathic granite, and, looking 25° east of north, the course of the Colorado was tracked by clouds of flying sand. The Gila comes into it nearly at right angles, and the point of junction, strangely chosen, is the hard butte through which, with their united forces they cut a cañon, and then flow off due magnetic west, in a direction of the resultant due to the relative strength of the rivers.

The walls of the cañon are vertical, and about 50 feet high, and 1,000 feet long. Almost before entering the cañon, in descending the Gila, its sea-green waters are lost in the chrome colored hue of the Colorado. For a distance of three or four miles below the junction, the river is perfectly straight, and about 600 feet wide; and up, at least, to this point, there is little doubt that the Colorado is always navigable for steamboats. Above, the Colorado is full of shifting sandbars, but is, no doubt, to a great extent susceptible of navigation.

The Gila, at certain stages, might be navigated up to the Pimos village, and possibly with small boats at all stages of water.

Near the junction, on the north side, are the remains of an old Spanish church, built near the beginning of the 17th century, by the renowned missionary, Father Kino. This mission was eventually sacked by the Indians, and the inhabitants all murdered or driven off. It will probably yet be the seat of a city of wealth and importance, most of the mineral and fur regions of a vast extent of country being drained by the two rivers. The stone butte through which they have cut their passage is not more than a mile in length. The Gila once flowed to the south, and the Colorado

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to the north of this butte, and the point of junction was below. What freak of nature united their efforts in forcing the butte, is difficult to say. During freshets, it is probable the rivers now discharge their surplus waters through these old channels. Francisco informs me that the Colorado, seven days' travel up from the butte, continues pretty much as we saw it.

There a cañon is reached impassable for horses or canoes. The country between is settled by the Coyotaros, or wolf-eaters, *cochineans*, (dirty fellows,) Los Tontears, or fools, and the Garroteros, or club Indians. These cultivate melons, beans, and maize.

On our return we met a Mexican, well mounted and muffled in his blanket. I asked him where he was going; he said, to hunt horses. As he passed, I observed in each of his holsters the neck of a bottle, and on his croup a fresh made sack, with other evidences of a preparation for a journey. Much against his taste, I invited him to follow me to camp; several times he begged me to let him go for a moment, that he would soon return. His anxiety to be released increased my determination not to comply with his request. I took him to General Kearny and explained to him the suspicious circumstances under which I had taken him, and that his capture would prove of some importance. He was immediately searched, and in his wallet was found the mail from California, which was of course opened.

Among the letters was one addressed to General Jose Castro, at Alta, one to Antonio Castro, and others to men of note in Sonora. All suspected of relating to public affairs were read, and we ascertained from them that a counter revolution had taken place in California, that the Americans were expelled from Santa Barbara, Puebla de los Angeles, and other places, and that Robideaux, the brother of our interpreter, who had been appointed alcalde by the Americans, was a prisoner in jail. They all spoke exultingly of having thrown off "the detestable Anglo-Yankee yoke," and congratulated themselves that the tri-color once more floated in California.

Captain Flores was named as the general and governor, pro tem., and the enthusiasm of the people described as overflowing in the cause of emancipation from the Yankee yoke. One letter gave a minute and detailed account of a victory stated to have been obtained over the Americans. It stated that 450 men landed at San Pedro, and were met, defeated, and driven back to the fort at San Pedro. This last was attributed by us to Mexican braggadocio, as it is usual with them to represent their defeats as victories; but that there was a disturbance of a serious kind in the province, we could not doubt, from the uniformity of the accounts on that head. We also learned that the horses captured were in part for General Castro. Nothing more was wanting to legitimize our capture, and Captain Moore was directed to remount his men.

The letters contained precise information, but being dated so far back as the 15th October, left us in great doubt as to the real state of affairs in California, and the Mexicans played their parts so dexterously, it was not in our power to extract the truth from them.

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One of the party, who had received some little favor from Carson in California, was well plied with brandy, but all that could be extorted from him was the advice that we should not think of going to the Puebla with our small force, counsel that our friend soon learned we had not the slightest intention of following.

The position of our camp, about one mile and a half south of the junction of the Colorado and Gila rivers, determined by 12 circum-meridian altitudes of sirius, 6 of saturn, and 12 altitudes of polaris, is latitude 32° 42′ 09″. The longitude by one set of lunar distances, E. and W., 114° 37′ 09″, which agrees with the chronometric determination of the same place, determined by assuming the longitude of San Diego to be 117° 11′.

The clouds, together with my military duties, interfered with taking a more elaborate set of lunar distances. An inspection of the individual observations for latitude will show that the latitude of the camp may be relied on, but I regret it was not in my powe to measure the exact distance of our camp from the mouth of the Gila.

At night, passing my arm over the surface of the fur robe in which I was enveloped, electric sparks were discharged in such quantities as to make a very luminous appearance, and a noise like the rattle of a snake.

November 24.—We visited the camp of our Mexican friends, whom the general determined to release, and found there was a woman with the party in the agonies of childbirth. She was at once furnished from our stores with all the comforts we possessed. This poor creature had been dragged along, in her delicate situation, over a fearful desert.

The captured horses were all wild and but little adapted for immediate service, but there was rare sport in catching them, and we saw for the first time the lazo thrown with inimitable skill. It is a saying in Chihuahua that "a Californian can throw the lazo as well with his foot as a Mexican can with his hand," and the scene before us gave us an idea of its truth. There was a wild stallion of great beauty which defied the fleetest horse and the most expert rider. At length a boy of fourteen, a Californian, whose graceful riding was the constant subject of admiration, piqued by repeated failures, mounted a fresh horse, and, followed by an Indian, launched fiercely at the stallion.

His lareat darted from his hand with the force and precision of a rifle ball, and rested on the neck of the fugitive; the Indian, at the same moment, made a successful throw, but the stallion was too stout for both, and dashed off at full speed, with both ropes flyin the air like wings. The perfect representation of Pegasus, he took a sweep, and followed by his pursuers, came thundering down the dry bed of the river. The lazos were now trailing on the ground, and the gallant young Spaniard, taking advantage of the circumstance, stooped from his flying horse and caught one in his hand. It was the work of a moment to make it fast to the pommel of his saddle, and by a short turn of his own horse, he threw the stallion a complete somerset, and the game was secure.

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We traveled over a sandy plain a few miles, and descended into the wide bed of the Colorado, overgrown thickly with mezquite, willow, and cotton wood; after making about ten miles, we encamped abreast of the ford on a plateau covered with young willows, of which our horses were to lay in a sufficient supply to last them over the desert. Since writing the above, we have found a good patch of grass, and our people have been ordered to cut a ration for each mule to carry along.

The night was excessively cold and damp, and in the morning our blankets were covered with a little dew. For the first time, the bugle calls were distinctly reverberated, showing the atmospheric change as we approach the coast, and descend into the neighborhood of the sea level. In New Mexico, even when surrounded by hills and perpendicular walls, the report of fire arms, and the sound of the bugle, were unattended by any distinct echo. The reports were sharp and unpleasant, not rounded, as here, by the reverberation.

The country, from the Arkansas to this point, more than 1,200 miles, in its adaptation to agriculture, has peculiarities which must forever stamp itself upon the population which inhabits it. All of North Mexico, embracing New Mexico, Chihuahua, Sonora, and the Californias, as far north as the Sacramento, are, as far as the best information goes, the same in the physical character of its surface, and differ but little in climate or products.

In no part of this vast tract can the rains from Heaven be relied upon, to any extent, for the cultivation of the soil. The earth is destitute of trees, and in great part also of any vegetation whatever.

A few feeble streams flow in different directions from the great mountains, which in many places traverse this region. These streams are separated, sometimes by plains, and sometimes by mountains, without water and without vegetation, and may be called deserts, so far as they perform any useful part in the sustenance of animal life.

The cultivation of the earth is therefore confined to those narrow strips of land which are within the level of the waters of the streams, and wherever practised in a community with any success, or to any extent, involves a degree of subordination, and absolute obedience to a chief, repugnant to the habits of our people.

The chief who directs the time and the quantity of the precious irrigating water must be implicitly obeyed by the whole community. A departure from his orders, by the waste of water, or unjust distribution of it, or neglect to make the proper embankments, may endanger the means of subsistence of many people. He must therefore be armed with power to punish promptly and immediately.

The profits of labor are too inadequate for the existence of negro slavery. Slavery, as practised by the Mexicans, under the form of peonage, which enables their master to get the services of the adult while in the prime of life, without the obligation of rearing him in infancy, supporting him in old age, or maintaining his family, affords no data for estimating the profits of slave labor, as it exists in the United States.

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No one who has ever visited this country, and who is acquainted with the character and value of slave labor in the United States, would ever think of bringing his own slaves here with any view to profit, much less would he purchase slaves for such a purpose. Their labor here, if they could be retained as slaves, among peons, nearly of their own color, would never repay the cost of transportation, much less the additional purchase money.

I made many inquiries as to the character of the vast region of country embraced in the triangle, formed by the Colorado of the west, the Del Norte, and the Gila; and the information collected, will, at some future time, be thrown into notes for the benefit of future explorers, but are not given in this work, as I profess to write only of what I saw.

From all that I learn, the country does not differ, materially, in its physical character from New Mexico, except, perhaps, being less denuded of soil and vegetation. The sources of the Salinas, the San Francisco, Azul, San Carlos, and Prierte, tributaries of the Gila, take their rise in it. About their head waters, and occasionally along their courses, are presented sections of land capable of irrigation.

The whole extent, except on the margin of streams, is said to be destitute of forest trees. The Apaches, a very numerous race, and the Navajoes, are the chief occupants, but there are many minor bands, who, unlike the Apaches and Navajoes, are not nomadic, but have fixed habitations. Amongst the most remarkable of these are the Soones, most of whom are said to be Albinos. The latter cultivate the soil, and live in peace with their more numerous and savage neighbors.

Departing from the ford of the Colorado in the direction of Sonora, there is a fearful desert to encounter. Alta, a small town, with a Mexican garrison, is the nearest settlement.

All accounts concur in representing the journey as one of extreme hardship, and even peril. The distance is not exactly known, but it is variously represented at from four to seven day's journey. Persons bound for Sonora from California, who do not mind a circuitous route, should ascend the Gila as far as the Pimos village, and thence penetrate the province by way of Tucsoon.

November 25.—At the ford, the Colorado is 1,500 feet wide, and flows at the rate of a mile and a half per hour. Its greatest depth in the channel, at the ford where we crossed, is four feet. The banks are low, not more than four feet high, and, judging from indications, sometimes, though not frequently, overflowed. Its general appearance at this point is much like that of the Arkansas, with its turbid waters and many shifting sand islands.

The ford is entered at the lower extremity of the plateau upon which we encamped, and leads down the river, crossing three sand islands, which we sketched, but as they are constantly shifting, will perhaps afford no guide to the traveller, and may even lead him into error. They are therefore not furnished. The ford is narrow and circuitous, and a few feet to the right or left sets a horse afloat. This happened to my own horse.

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Report makes the distance of the mouth of the Colorado, from the crossing, eighty miles, but unless the river is very crooked, this cannot be; Lieut. Hardy, of the royal navy, determined the mouth to be in latitude 31° 51′ north, and longitude 114° 1′.

The growth on the river bottom is cotton wood, willow of different kinds, equisetum hyemale, (scouring rush,) and a nutritious grass in small quantities.

After crossing, we ascended the river three quarters of a mile, where we encountered an immense sand drift, and from that point until we halted, the great highway between Sonora and California lies along the foot of this drift, which is continually but slowly encroaching down the valley. Prosopis glandulosa, wild sage, and ephedra compose the growth; the first is luxuriant.

We halted at a dry arroyo, a few feet to the left of the road, leading into the Colorado, where there was a hole five or six feet deep, which by deepening furnished sufficient water for the men.

We are yet, by the indication of the barometer, but 20 or 30 feet above the river, and where the sands from the desert to the north have not encroached, the soil appears good. There are remains of zequias about five miles back, and where we halted, the remains of Indian settlements, but it is probable the water has been cut off by the drift, and cannot now be brought from the river above.

I made observations at night for time and latitude, and found the position of the place to be north latitude 32° 40′ 22″, and longitude 114° 56′ 28″, west of Greenwich.

We tied our animals to the mezquite trees, (prosopis glandulosa,) and remarking on the way that they showed an inclination to eat the bean of this plant, we sent the men to collect them; the few gathered were eaten with avidity.

November 26.—The dawn of day found every man on horseback, and a bunch of grass from the Colorada tied behind him on the cantle of his saddle. After getting well under way, the keen air at 26° Fahrenheit made it most comfortable to walk. We traveled four miles along the sand butte, in the same direction as yesterday, about south 75° west, (magnetic,) we mounted the buttes and found, after a short distance, a firmer footing covered with fragments of lava, rounded by water, and many agates. We were now fairly on the desert.

Our course now inclined a few degrees more to the north, and at 10, a. m., we found a large patch of grama, where we halted for an hour, and then pursued our way over the plains covered with fragments of lava, traversed at intervals by sand buttes, until 4 p. m., when, after travelling 24 miles, we reached the Alamo or cotton wood. At this point, the captured Spaniards informed us, that failing to find water, they had gone a league to the west, in pursuit of their horses, where they found a running stream. We accordingly sent parties to search, but neither the water nor their trail could be found.

Neither was there any cotton wood at the Alamo, as its name would signify; but Francisco said that it was nevertheless the place, the tree having probably been covered by the encroachments of the

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sand, which here terminates in a bluff 40 feet high, making the arc of a great circle convexing to the north.

Descending this bluff, we found in what had been the channel of a stream, now overgrown with a few ill-conditioned mezquite, a large hole where persons had evidently dug for water. It was necessary to halt to rest our animals, and the time was occupied in deepening this hole, which after a long struggle, showed signs of water. An old champagne basket, used by one of the officers as a pannier, was lowered in the hole, to prevent the crumbling of the sand. After many efforts to keep out the caving sand, a basket-work of willow twigs effected the object, and much to the joy of all, the basket, which was now 15 or 20 feet below the surface, filled with water. The order was now given for each mess to draw a camp-kettle of water, and Captain Turner was placed in charge of the spring, to see fair distribution.

When the messes were supplied, the firmness of the banks gave hopes that the animals might be watered, and each party was notified to have their animals in waiting; the important business of watering then commenced, upon the success of which depended the possibility of their advancing with us a foot further.

Two buckets for each animal were allowed. At 10, a. m., when my turn came, Captain Moore had succeeded, by great exertions, in opening another well, and the one already opened began to flow more freely, in consequence of which, we could afford to give each animal as much as he could drink. The poor brutes, none of which had tasted water in forty-eight hours, and some not for the last sixty, clustered round the well and scrambled for precedence.

At 12 o'clock I had watered all my animals, thirty-seven in number, and turned over the well to Captain Moore.

The animals still had an aching void to fill, and all night was heard the munching of sticks, and their piteous cries for more congenial food.

November 27 *and* 28.—To-day we started a few minutes after sunrise. Our course was a winding one, to avoid the sand-drifts. The Mexicans had informed us that the waters of the salt lake, some thirty or forty miles distant, were too salt to use, but other information led us to think the intelligence was wrong. We accordingly tried to reach it; about 3, p. m., we disengaged ourselves from the sand and went due (magnetic) west, over an immense level of clay detritus, hard and smooth as a bowling green.

The desert was almost destitute of vegetation, now and then an ephedra, œnothera, or bunches of aristida were seen, and occasionally the level was covered with a growth of obione canescens, and a low bush with small oval plaited leaves, unknown.

The heavy sand had proved too much for many horses and some mules, and all the efforts of their drivers could bring them no farther than the middle of this dreary desert. About 8 o'clock, as we approached the lake, the stench of dead animals confirmed the reports of the Mexicans, and put to flight all hopes of our being able to use the water.

The basin of the lake, as well as I could judge at night, is about

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three-quarters of a mile long and half a mile wide. The water had receded to a pool, diminished to one-half its size, and the approach to it was through a thick soapy quagmire. It was wholly unfit for man or brute, and we studiously kept the latter from it, thinking that the use of it would but aggravate their thirst.

One or two of the men came in late and, rushing to the lake, threw themselves down and took many swallows before discovering their mistake; but the effect was not injurious except that it increased their thirst.

At the point where we left the sand, sketches were taken of the objects by which our pilot wended his way; these may serve to guide future travellers. From this point the traveller may go directly to the gap exhibited in the sketch, nearly magnetic west, through which the trail passes.

A few mezquite trees and a chenopodiaceous shrub bordered the lake, and on these our mules munched till they had sufficiently refreshed themselves, when the call to saddle was sounded, and we groped silently our way in the dark. The stoutest animals now began to stagger, and when day dawned, scarcely a man was seen mounted.

With the sun rose a heavy fog from the southwest, no doubt from the gulf, and sweeping towards us, enveloped us for two or three hours, wetting our blankets and giving relief to the animals. Before it had dispersed we came to a patch of sun-burned grass.

When the fog had entirely dispersed we found ourselves entering a gap in the mountains, which had been before us for four days. The plain was crossed, but we had not yet found water. The first valley we reached was dry, and it was not till 12 o'clock, m., that we struck the Cariso (cane) creek, within half a mile of one of its sources, and although so close to the source, the sands had already absorbed much of its water, and left but little running. A mile or two below, the creek entirely disappears.

We halted, having made fifty-four miles in the two days, at the source, a magnificent spring, twenty or thirty feet in diameter, highly impregnated with sulphur, and medicinal in its properties. No vessel could be procured to bring home some of the water for analysis, but I scraped a handful of the salt which had effloresced to the surface of the adjacent ground, and Professor Frazer finds it to contain sulphate of lime, magnesia, and chloride of sodium.

The spring consisted of a series of smaller springs or veins, varying in temperature from 68° to 75°. This variation, however, may have been owing to the different exposures of the fountains in which the thermometer was immersed. The growth was cane, rush, and a coarse grass, such as is found on the marshes near the sea shore.

The desert over which we had passed, ninety miles from water to water, is an immense triangular plain, bounded on one side by the Colorado, on the west by the Cordilleras of California, the coast chain of mountains which now encircles us, extending from the Sacramento river to the southern extremity of Lower California, and on the northeast by a chain of mountains, a continuation of

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the same spur noted on the 22d as running southeast and northwest. It is chiefly covered with floating sand, the surface of which in various places, is white with diminutive spinelas, and every where over the whole surface is found the large and soft muscle shell.

I have noted the only two patches of grass found during the "jornada." There were scattered, at wide intervals, the palafoxia linearis, atriplex, encelia farinosa, daleas, euphorbias, and a simsia, described by Dr. Torrey as a new species without rays.

The southern termination of this desert is bounded by the Tecaté chain of mountains and the Colorado; but its northern and eastern boundaries are undefined, and I should suppose from the accounts of trappers, and others, who have attempted the passage from California to the Gila by a more northern route, that it extends many days' travel beyond the chain of barren mountains which bound the horizon in that direction.

The portal to the mountains through which we passed, was formed by immense buttes of yellow clay and sand, with large flakes of mica and seams of gypsum. Nothing could be more forlorn and desolate in appearance. The gypsum had given some consistency to the sand buttes which were washed into fantastic figures. One ridge formed apparently a complete circle, giving it the appearance of a crater; and although some miles to the left, I should have gone to visit it, supposing it to be a crater, but my mule was sinking with thirst, and water was yet at some distance. Many animals were left on the road to die of thirst and hunger, in spite of the generous efforts of the men to bring them to the spring. More than one was brought up, by one man tugging at the halter and another pushing up the brute, by placing his shoulder against its buttocks. Our most serious loss, perhaps, was that of one or two fat mares and colts brought with us for food; for before leaving camp, Major Swords found in a concealed place one of the best pack mules slaughtered, and the choice bits cut from his shoulders and flanks, stealthily done by some mess less provident than others.

I observed at night for time and latitude; for longitude by measuring 18 distances between the ☾ and aldebaran, and the ☾ and fomaihaut.

Latitude 32° 52′ 33″. Longitude 116° 06′ 09″.

November 29.—The grass at the spring was anything but desirable for our horses, and there was scarcely a ration left for the men. This last consideration would not prevent our giving the horses a day's rest wherever grass could be found. We followed the dry sandy bed of the Cariso nearly all day, at a snail's pace, and at length reached the "little pools" where the grass was luxuriant but very salt. The water strongly resembled that at the head of the Cariso creek, and the earth, which was very tremulous for many acres about the pools, was covered with salt.

This valley is at no point more than half a mile wide, and on each side are mountains of grey granite and pure quartz, rising from 1,000 to 3,000 feet above it.

A few miles from the spring called Ojo Grande, at the head of the creek, several scattered objects were seen projected against the

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cliffs, hailed by the Florida campaigners, some of whom were along, as old friends. They were cabbage trees, and marked the locale of a spring and a small patch of grass. We found also to-day, in full bloom, the bronnia spinosa, a rare and beautiful plant; the plantago, new to our flora; a new species of eriogonum, very remarkable for its extremely numerous long hair-like fruit stalks and minute flowers.

We rode for miles through thickets of the centennial plant, agave Americana, and found one in full bloom. The sharp thorns terminating every leaf of this plant, were a great annoyance to our dismounted and wearied men whose legs were now almost bare. A number of these plants were cut by the soldiers, and the body of them used as food. The day was intensely hot, and the sand deep; the animals, inflated with water and rushes, gave way by scores; and, although we advanced only sixteen miles, many did not arrive at camp until 10 o'clock at night. It was a feast day for the wolves, which followed in packs close on our track, seizing our deserted brutes and making the air resound with their howls as they battled for the carcasses.

The water comes to the surface in pools at this place. It is a valley surrounded by high bleak mountains destitute of vegetation. The mountains are of a micaceous granite seamed with volcanic matter. The grass, which is coarse, extends for a mile or two along the valley.

A heavy cloud overhung the mountains to the west, and the wind blew a hurricane from that quarter; yet our zenith was never obscured, except for a minute at a time by a fleeting cloud detached from the great bank. A horse was killed for food, which was eaten with great appetite, and all of it consumed.

November 30.—Notwithstanding the water was saltish and in pools, and the grass unfavorable to the horses, yet we were compelled to avail ourselves of it for a day to recruit. The day and night were very unpleasant, from the high wind which came over the snow-clad mountains to the west. The ground, too, was tremulous, and my observations for time, by which I hoped to obtain the rate of my chronometers, were not such as I could desire.

December 1.—We ascended the valley, now destitute of both grass and water, to its termination, and then descended to the deserted Indian village of San Felippe. The mountains on either side are lofty, I suppose from 3,000 to 5,000 feet high, and those to the west encrusted on the top with snow and icicles. Our camp was in a long field of grass, three or four miles in extent, through which a warm stream flowed and drained through a cañon to the north, abreast of the village. We went to the barren hills and collected the dry sage and scrub mezquite, with which we made a feeble fire. The larrea Mexicana grew here also, but it is unfit for fuel.

About nine miles from the camp, we passed the summit which is said to divide the waters flowing into the Colorado from those flowing into the Pacific, but I think it is a mistake. The pass is much below the peaks on either side, and the height gives no indi-

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cation of the elevation of the range, and, indeed, the barometric reading was but an indifferent index of the height of the pass, as the day was stormy. We are still to look for the glowing pictures drawn of California. As yet, barrenness and desolation hold their reign. We longed to stumble upon the rancherias, with their flocks of fat sheep and cattle. Meat of horses, may be very palatable when fat, but ours are poor and tough, and it is hard to satisfy the cravings of hunger with such indifferent food.

Early in the day's march, we met two Indians, a man and woman; they could give us no information of what was passing on the western side of the mountains. They continued on with the utmost indifference, exhibiting no signs of fear or astonishment at this sudden apparition of ragged blue-coats. They had fine athletic figures, but were prematurely wrinkled from poverty and exposure to cold.

December 2 and 3.—We commenced to ascend another "divide," and as we approached the summit the narrow valley leading to it was covered with timber and long grass. On both sides, the evergreen oak grew luxuriantly, and, for the first time since leaving the states, we saw what would even there be called large trees. Emerging from these, we saw in the distance the beautiful valley of the Aqua Caliente, waving with yellow grass, where we expected to find the rancheria owned by an American named Warner.

As we passed, crows and wolves were seen in numbers.

Leaving the valley, we ascended the hills to the north covered with mezquite, estafiat, &c. Our progress was slow and painful; we thought Warner's rancheria never would open on our eager sight, when suddenly it burst upon our view at the foot of the hill. We were mistaken for Indians, and soon were seen horsemen at full speed leading off cattle and horses to the mountains. We quickened our pace to arrest this proceeding. The rancheria was in charge of a young fellow from New Hampshire, named Marshall. We ascertained from him, that his employer was a prisoner to the Americans in San Diego, that the Mexicans were still in possession of the whole of the country except that port, San Francisco, and Monterey; that we were near the heart of the enemy's stronghold, whence he drew his supplies of men, cattle and horses, and that we were now in possession of the great pass to Senora, by which he expected to retreat, if defeated, to send his prisoners if successful, and to commmunicate with Mexico.

To appease hunger, however, was the first consideration. Seven of my men eat, at one single meal, a fat full grown sheep. Our camp was pitched on the road to the Pueblo, leading a little north of west. To the south, down the valley of the Aqua Caliente, lay the road to San Diego. Above us was Mr. Warner's backwoods, American looking house, built of adobe and covered with a thatched roof. Around, were the thatched huts of the more than half naked Indians, who are held in a sort of serfdom by the master of the rancheria. I visited one or two of these huts, and found the inmates living in great poverty. The thermometer was at 30°, they had no fires, and no coverings but sheepskins. They told me, that

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when they were under the charge of the missions they were all comfortable and happy, but since the good priests had been removed, and the missions placed in the hands of the people of the country, they had been ill-treated. This change took place in 1836, and many of the missions passed into the hands of men and their connexions, who had effected the change.

Near the house is the source of the Aqua Caliente, a magnificent hot spring, of the temperature of 137° Fahrenheit, discharging from the fissure of a granite rock a large volume of water, which, for a long distance down, charges the air with the fumes of sulphuretted hydrogen. Above it, and draining down the same valley, is a cold spring of the temperature of 45°, and without the aid of any mechanical instrument, the cold and warm water may be commingled to suit the temperature of the bather.

The Indians have made pools for bathing. They huddle around the basin of the spring to catch the genial warmth of its vapors, and in cold nights immerse themselves in the pools to keep warm. A day will come, no doubt, when the invalid and pleasure seeking portion of the white race, will assemble here to drink and bathe in these waters, ramble over the hills which surround it on all sides, and sit under the shade of the great live oaks that grow in the valley.

Our information in reference to the state of affairs in California was yet very imperfect and unsatisfactory. Marshall spoke of a Mr. Stokes, an Englishman, who lived fifteen miles distant, on the road to San Diego. The general at once despatched Marshall to him, and in three hours he appeared in our camp, presenting a very singular and striking appearance. His dress was a black velvet English hunting coat, a pair of black velvet trowsers, cut off at the knee and open on the outside to the hip, beneath which were drawers of spotless white; his leggins were of black buck-skin, and his heels armed with spurs six inches long. Above the whole bloomed the broad merry face of Mr. Stokes, the Englishman. He was very frank, proclaimed himself a neutral, but gave us all the information he possessed; which was, that Commodore Stockton was in possession of San Diego, and that all the country between that place and Santa Barbara was in possession of the "country people." He confirmed all that Marshall had said, and stated he was going to San Diego the next morning. The general gave him a letter for that place.

I made observations at night for time and latitude, but the flying clouds, and the trembling ground on which we were encamped, made it a delicate operation.

Information was received on the 2d, that fifteen miles distant, on the road to the Pueblo, a band of horses and mules were catched, belonging to General Flores and others. Tired as our people were, nightfall found twenty-five of them in the saddle, with fresh horses, under the command of Lieut. Davidson, accompanied by Carson, on their way in pursuit of the cache. Davidson was successful, and returned with the horses on the 3d, about meridian; but the animals,

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like those we captured at the mouth of the Gila, were mostly unbroken, and not of much service.

My observations give for the latitude of our camp of this date, which was on the meadow to the south of the rancheria, 33° 16′ 57″.

We remained in camp on the 3d to rest.

December 4.—The morning was murky, and we did not start till 9 o'clock, about which time it commenced to rain heavily, and the rain lasted all day. Our route was chiefly through narrow valleys overtopped by high hills of some fertility, covered with oaks. We were now in the region of rains, and the vegetation, though not luxuriant, was very much changed, but it was too late in the fall to get the flowers or fruits to determine the plants.

Our camp was pitched, after marching 13½ miles, in the valley of the Rio Isabel, near the rancheria of Mr. Stokes, formerly the mission of Saint Isabel.

Mr. S. had gone, but he left his keys with a man whom the Spaniards called Signor Beel, with directions to entertain us. The Signor was a deserter from an English merchant-man, and had lived in the neighboring mountains some ten years; during this time he had acquired a little property, and some knowledge of Spanish, but the sailor was visible in all his acts. Before night Mr. Beel had made good use of his keys, and shone in his true colors as sailor Bill.

We were drenched to the skin, and looked forward with some pleasure to the idea of once more entering a house, with a blazing fire and plenty to eat and drink. In the last two items we were entirely satisfied, but sadly disappointed in finding no fire, the only chimney about the rancheria being in the kitchen.

The dragoons took the dinner intended for the officers, and we were obliged to stand, cracking our heels in the cold damp chapel, now converted into a hall, for two hours, before the Signor, or rather Sailor Bill, could cook another dinner.

The appearance of desolation which the rancheria presents is little calculated to impress us with favorable notions of the agricultural resources of this part of California. The land in the narrow valleys is good, but surrounded every where by high barren mountains, and where the land is good, the seasons are too dry for men to attempt cultivation without facilities for irrigation.

December 5.—A cold rainy day, and the naked Indians of the rancheria gathered around our fires. We marched from the rancheria of San Isabel to that of Santa Maria. On the way we met Capt. Gillespie, Lieut. Beale, and Midshipman Duncan of the navy, with a party of thirty-five men, sent from San Diego with a despatch to Gen. Kearny. We arrived at the rancheria after dark, where we heard that the enemy was in force nine miles distant, and not finding any grass about the rancheria, we pushed on and encamped in a cañon two miles below. It was long after night when we halted, and though there may have been plenty of grass, we could not find it. Besides the rain, a heavy fog obscured the landscape, and little could be seen of the country during the day's jour-

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neying; what we did see, however, did not impress us favorably as to its fertility.

Although this was the rainy season, no flowing streams were crossed after leaving the San Isabel, and the ground was destitute of grass. Our camp was in a valley, overgrown with large oak trees and other shrubbery; but it was too dark to distinguish their character.

A party under Lieut. Hammond was sent to reconnoitre the enemy, reported to be near at hand. By some accident the party was discovered, and the enemy placed on the qui vive. We were now on the main road to San Diego, all the "by-ways" being in our rear, and it was therefore deemed necessary to attack the enemy, and force a passage. About 2 o'clock, a. m., the call to horse was sounded.

December 6.—We marched nine miles before day-break over a hilly country, leaving our packs to come on in the rear. The general invited Mr. Warner and myself to ride with him, and taking four of my party, I left Messrs. Bestor and Stanly with the rest, six in number, to take care of the baggage, and look after the instruments and notes.

When within a mile of the enemy, whose force was not known to us, his fires shone brightly. The general and his party were in advance, preceded only by the advanced guard of twelve men under Captain Johnston. He ordered a trot, then a charge, and soon we found ourselves engaged in a hand to hand conflict with a largely superior force.

For an account of this engagement, reference may be made to the official report of the general, which has been published. The subjoined topographical sketch will show the first and second position of the enemy, and his final rout. As day dawned, the smoke cleared away, and we commenced collecting our dead and wounded. We found 18 of our officers and men were killed on the field, and 13 wounded.

Amongst the killed were Captains Moore and Johnston, and Lieutenant Hammond of the 1st dragoons.

The general, Capt. Gillespie, Capt. Gibson, Lieut. Warner, and Mr. Robideau badly wounded.

A large body of horsemen were seen in our rear, and fears were entertained lest Major Swords and the baggage should fall into their hands. The general directed me to take a party of men and go back for Major Swords and his party. We met at the foot of the first hill, a mile in rear of the enemy's first position. Returning, I scoured the village to look for the dead and wounded. The first object which met my eye was the manly figure of Capt Johnston. He was perfectly lifeless, a ball having passed directly through the centre of his head.

The work of plundering the dead had already commenced; his watch was gone, nothing being left of it but a fragment of the gold chain by which it was suspended from his neck. By my directions Sergeant Falls and four men took charge of the body and carried it into camp. Captain Johnston and one dragoon were the only

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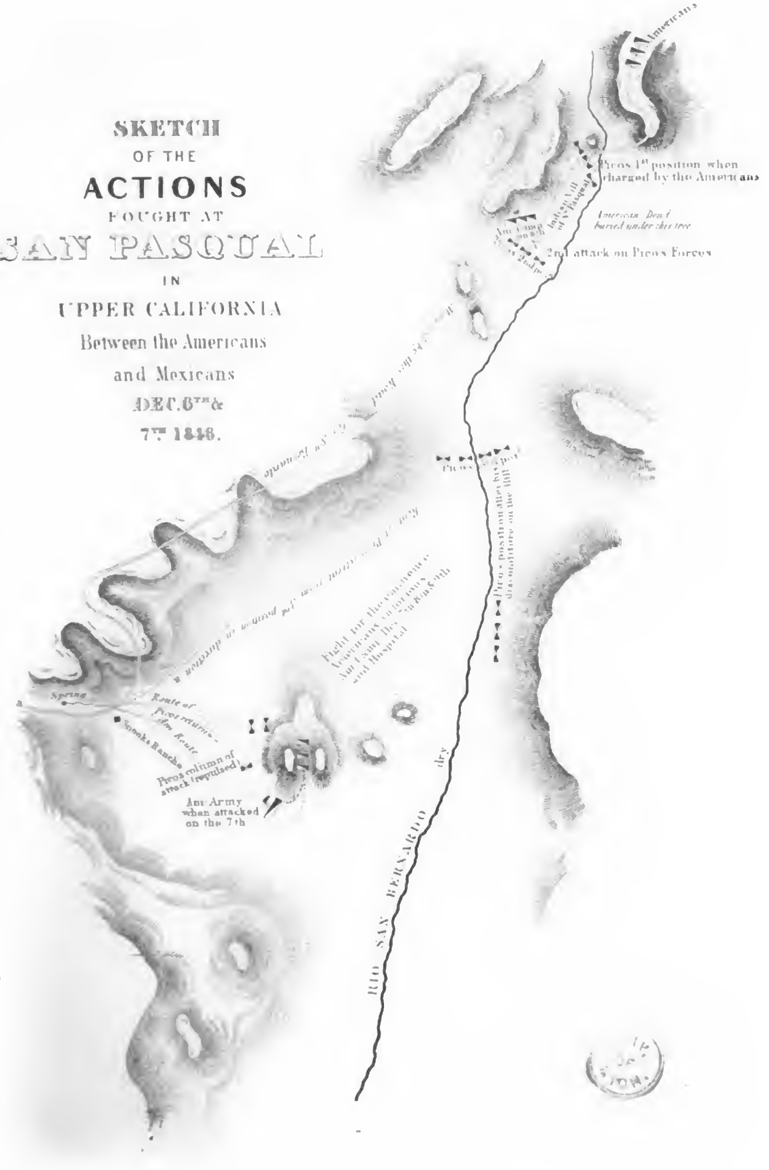

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persons either killed or wounded on our side in the fight by fire-arms.

Information was received that the dead, no matter where buried, would be dug up to rob the bodies of their clothes, and orders were given to pack them on mules, with the intention of carrying them to San Diego, but it was found that there were not a sufficient number of strong animals left to convey both the dead and the wounded, and directions were given therefore to inter them at night as secretly as possible.

When night closed in, the bodies of the dead were buried under a willow to the east of our camp, with no other accompaniment than the howling of myriads of wolves attracted by the smell. Thus were put to rest together, and forever, a band of brave and heroic men. The long march of 2,000 miles had brought our little command, both officers and men, to know each other well. Community of hardships, dangers, and privations, had produced relations of mutual regard which caused their loss to sink deeply in our memories.

The general's wounds were so serious, that during the day Captain Turner assumed command and directed operations. There was but one surgeon in our party, Dr. Griffin, and notwithstanding his great skill and assiduty, he did not finish dressing the wounded till late in the afternoon, nor were the ambulances for their transportation completed. This, with the desire to bury our dead under cover of night, caused the forward movement to be postponed till morning.

Our provisions were exhausted, our horses dead, our mules on their last legs, and our men, now reduced to one third of their number, were ragged, worn down by fatigue, and emaciated. The officers of Captain Gillespie's party said there were wheel carriages at San Diego, 39 miles distant, and it was determined to send there for the means of conveying our wounded. Early in the day, Godey, with a few picked men, was on his way by a circuitous route to that place.

Our position was defensible, but the ground, covered with rocks and cacti, made it difficult to get a smooth place to rest, even for the wounded. The night was cold and damp, and notwithstanding our excessive fatigues of the day and night previous, sleep was impossible.

December 7.—Day dawned on the most tattered and ill-fed detachment of men that ever the United States mustered under her colors. The enemy's pickets and a portion of his force were seen in front. The sick, by the indefatigable exertions of Dr. Griffin, were doing well, and the general enabled to mount his horse. The order to march was given, and we moved off to offer the enemy battle, accompanied by our wounded, and the whole of our packs. The ambulances grated on the ground, and the sufferings of the wounded were very distressing. We had made for them the most comfortable conveyance we could, and such as it was, we were indebted principally to the ingenuity of the three remaining mountain men of the party, Peterson, Londeau, and Perrot. The fourth,

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the brave François Ménard, had lost his life in the fight of the day before. The general resumed the command, placing Captain Turner, of the dragoons, in command of the remnant of dragoons, which were consolidated into one company.

Arranging our wounded and the packs in the centre, we marched towards San Diego in the direction of the San Barnardo rancheria, taking the right hand road over the hills, and leaving the river San Barnardo to the left. The enemy retired as we advanced. When we arrived at the rancheria of San Barnardo, we watered our horses and killed chickens for the sick. The rancheria was the property of Mr. Snooks, an Englishman; it was deserted except by a few Indians.

Finding no grass about the rancheria, we moved on towards the bed of the river, driving many cattle before us. We had scarcely left the house and proceeded more than a mile, when a cloud of cavalry debouched from the hills in our rear, and a portion of them dashed at full speed to occupy a hill by which we must pass, while the remainder threatened our rear. Thirty or forty of them got possession of the hill, and it was necessary to drive them from it. This was accomplished by a small party of six or eight, upon whom the Californians discharged their fire; and strange to say, not one of our men fell. The capture of the hill was then but the work of a moment, and when we reached the crest, the Californians had mounted their horses and were in full flight. We did not lose a man in the skirmish, but they had several badly wounded. By this movement we lost our cattle, and were convinced that if we attempted any further progress with the ambulances we must lose our sick and our packs. It was impossible to move in the open field with these incumbrances, a ainst an enemy more than twice our numbers, and all superbly mounted. The general, therefore, determined to halt, for the night to have the wounds of the sick re-dressed, and then to cut our way to San Diego.

December 8.—We bored holes for water, and killed the fattest of our mules for meat. In the morning a flag of truce was sent into our camp, informing us that Andreas Pico, the commander of the Mexican forces, had just captured four Americans, and wished to exchange them for a like number of Californians We had but one to exchange, and with this fellow I was sent to meet Andreas Pico, whom I found to be a gentlemanly looking, and rather handsome man.

The conversation was short; for I saw the man he wished to exchange was Burgess, one of those sent on the morning of the 6th to San Diego, and we were very anxious to know the result of his mission. Taking rather a contemptuous leave of his late captors, he informed us of the safe arrival of himself and Godey at San Diego. He also stated that when captured, his party, consisting of himself and two others, on their return from San Diego, had previously "cached" their letters under a tree, which he pointed out; but on subsequent examination, we found the letters had been abstracted.

Our wounded were still in no condition to move; to have at-

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tempted to transport them would have required one half of our fighting force, and it was decided most expedient to wait until they could be carried on horseback. At night, Lieutenant Beale, of the navy, Mr. Carson, and an Indian, volunteered to go to San Diego, 29 miles distant—an expedition of some peril, as the enemy now occupied all the passes to that town.

The observations made to-night give, for the latitude of this camp, 33° 03′ 42″, and the longitude 117° 03′ 29″.

Don Antonio Robideaux, a thin man of fifty-five years, slept next to me. The loss of blood from his wounds, added to the coldness of the night, 28° Fahrenheit, made me think he would never see daylight, but I was mistaken. He woke me to ask if I did not smell coffee, and expressed the belief that a cup of that beverage would save his life, and that nothing else would. Not knowing there had been any coffee in camp for many days, I supposed a dream had carried him back to the cafés of St. Louis and New Orleans, and it was with some surprise I found my cook heating a cup of coffee over a small fire made of wild sage. One of the most agreeable little offices performed in my life, and I believe in the cook's, to whom the coffee belonged, was, to pour this precious draught into the waning body of our friend Robideaux. His warmth returned, and with it hopes of life. In gratitude he gave me, what was then a great rarity, the half of a cake made of brown flour, almost black with dirt, and which had, for greater security, been hidden in the clothes of his Mexican servant, a man who scorned ablutions. I eat more than half without inspection, when, on breaking a piece, the *bodies* of several of the most loathesome insects were exposed to my view. My hunger, however, overcame my fastidiousness, and the morceau did not appear particularly disgusting till after our arrival at San Diego, when several hearty meals had taken off the keenness of my appetite, and suffered my taste to be more delicate.

Last night the brave Sergeant Cox died of his wounds, and was buried to-day deep in the ground, and covered with heavy stones, to prevent the wolves from tearing him up. This was a gallant fellow, who had, just before leaving Fort Leavenworth, married a pretty wife.

December 10.—The enemy attacked our camp, driving before them a band of wild horses, with which they hoped to produce a stampede. Our men behaved with admirable coolness, turning off the wild animals dexterously. Two or three of the fattest were killed in the charge, and formed, in the shape of a gravy-soup, an agreeable substitute for the poor steaks of our worn down brutes, on which we had been feeding for a number of days.

Doctor Griffin gave the welcome information that all the sick, but two, were able to get in the saddle, and orders were given to march the next morning.

There was little expectation that Carson and Lieutenant Beale would succeed in reaching San Diego; the hiding place pointed out by Burgess was examined, and the letters from San Diego were not found.

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We were all reposing quietly, but not sleeping, waiting for the break of day, when we were to go down and give the enemy another defeat. One of the men, in the part of the camp assigned to my defence, reported that he heard a man speaking in English. In a few minutes we heard the tramp of a column, followed by the hail of the sentinel. It was a detachment of 100 tars and 80 marines under Lieutenant Gray, sent to meet us by Commodore Stockton, from whom we learned that Lieutenant Beale, Carson, and the Indian, had arrived safely in San Diego. The detachment left San Diego on the night of the 9th, cached themselves during the day of the 10th, and joined us on the night of that day. These gallant fellows busied themselves till day distributing their provisions and clothes to our naked and hungry people.

December 11.—The junction of our forces was a complete surprise to the enemy, and when the sun rose, but a small squadron of horse was to be seen at Stokes's rancheria. They had fled precipitately, leaving most of the cattle behind them, for which we had been contending for the last three days. None of our men were mounted—theirs were all mounted; and why they should have left their stock is inconceivable. It was certainly not incompatible with their safety to have carried them all away. The only way of accounting for it, is, by supposing our night attack had filled them with the unnecessary fear of being surprised. We drove the cattle before us.

Our march was in close order, over a road leading through a rolling country of light black soil, destitute of trees, and without water, covered with oats indigenuous to the soil, now fallen to decay. The grass in protected places was sprouting, but not in sufficient quantity to afford grazing to our stock. After marching twelve miles we arrived at the rancheria of Signor Alvarado, a person who was in the fight against us. The women and children had fled to the mountains, leaving plenty of turkies, chickens, goats and sheep behind; also two casks of wine, the produce of the country. The havoc committed on the comestibles was immense; the sheep not killed were driven by us into San Diego. The owner had taken the oath of allegiance to the United States and broken it.

The navy took a prisoner at this house as they marched to meet us. He gave us much information, and was then liberated. He stated that Pico's force consisted of 160 men, 100 of which were drawn from the Pueblo, and the balance from the surrounding country. We subsequently received authentic accounts that his number was 180 men engaged in the fight, and that 100 additional men were sent him from the Pueblo, who reached his camp on the 7th.

There was a fine spring at this rancheria, and another two miles below it.

On the hill, before reaching the rancheria, the Pacific opened for the first time to our view, the sight producing strange but agreeable emotions. One of the mountain men who had never seen the ocean

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before, opened his arms and exclaimed: "Lord! there is a great prairie without a tree."

December 12.—We followed the Solidad through a deep fertile valley in the shape of a cross. Here we ascended to the left a steep hill to the table lands, which, keeping for a few miles, we descended into a waterless valley, leading into False bay at a point distant two or three miles from San Diego. At this place we were in view of the fort overlooking the town of San Diego and the barren waste which surrounds it.

The town consists of a few adobe houses, two or three of which only have plank floors. It is situated at the foot of a high hill on a sand flat, two miles wide, reaching from the head of San Diego bay to False bay. A high promontory of nearly the same width, runs into the sea four or five miles and is connected by the flat with the main land. The road to the hide houses leads eastward of this promontory, and abreast of them the frigate Congress and the sloop Portsmouth are at anchor. The hide houses are a collection of store houses where the hides of cattle are packed before being shipped; this article forming the only trade of the little town.

The bay is a narrow arm of the sea indenting the land some four or five miles, easily defended, and having twenty feet of water at the lowest tide. The rise is said to be five feet, making the greatest water twenty-five feet.

Standing on the hill which overlooks the town, and looking to the northeast, I saw the mission of San Diego, a fine large building now deserted. The Rio San Diego runs under ground in a direct course from the mission to the town, and sweeping around the hill, discharges itself into the bay. Its original debouche was into False bay, where, meeting the waters rolling in from the seaward, a bar was formed by the deposite of sand, making the entrance of False bay impracticable.

Well grounded fears are entertained that the immense quantity of sand discharged by this river will materially injure, if it does not destroy the harbor of San Diego; but this evil could be arrested at a slight cost, compared with the objects to be obtained. At present San Diego is, all things considered, perhaps one of the best harbors on the coast from Callao to Puget's Sound, with a single exception, that of San Francisco. In the opinion of some intelligent navy officers, it is preferable even to this. The harbor of San Francisco has more water, but that of San Diego has a more uniform climate, better anchorage, and perfect security from winds in any direction. However, the commercial metropolis must be at San Francisco, owing to the greater extent and superiority of the country adjacent, watered by the rivers Sacramento and San Joachim, unless indeed it should be made the terminus of a railroad leading by the route of the Gila to the Del Norte, and thence to the Mississippi and the Atlantic.

The rain fell in torrents as we entered the town, and it was my singular fate here, as in Santa Fé, to be quartered in the calaboose, a miserable hut, of one room, some 40 + 30 feet square. A huge

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old gun was mounted in this hovel, looking through an embrasure to the westward. In this building I was told that I could stow my party and my instruments safely.

We preferred the open air and the muddy plaza, saturated with all sorts of filth, to this wretched hole; but having no alternative, our chronometers and instruments were stowed in it and guarded by the indefatigable Mr. Bestor. I went off to accept from the hospitality of a friend the first bed I had seen in many months. About midnight there was one of those false alarms which ever and anon disturbed this goodly town. Four burly fellows rushed to man this gun, but they found themselves unexpectedly opposed by Mr. Bestor and two or three of my party. But for this timely resistance, my whole little stock of chronometers, barometer, &c., would have been totally destroyed. In the morning, through the kind exertions of my friend, Captain Gillespie, I was enabled to get a house with two rooms, the only unoccupied quarters in the town. Foreseeing employment of a different nature, my little party occupied themselves busily in collecting and bringing up the notes of our field-work.

On the 28th December I received notification from General Kearny to leave my party in San Diego and report to him for duty, as the acting adjutant general of the forces; Captain Turner, his adjutant general, having been assigned by him to the command of the remnant of the company of the 1st dragoons.

Mr. Warner was still too unwell, from the wounds received at San Pasqual, to accompany us, or to commence the survey of San Diego bay. Wishing to have a secure place to deposite my instruments, notes, &c., I applied to Captain Dupont to give them a place on board the Cyane. He granted this request, and kindly insisted that Mr. Bestor and Mr. Stanly should also go on board, where they could pursue their work unmolested.

I should be very ungrateful if I did not here make my acknowledgments to Captain Dupont, and all the officers of the navy with whom we were thrown in contact, for the uniform kindness and the generous hospitality with which they always supplied our personal wants, and the promptness with which they rendered assistance in any public enterprise.

My work as topographical engineer may be considered to end at this place; and that portion of the map embraced between San Diego and the Pueblo or Ciudad de los Angeles is compiled from existing maps, with slight alterations made by myself from a view of the ground, without the aid of instruments.

The coast is taken from old Spanish charts, published in Madrid in 1825, kindly furnished me by Captain Wilkes. The harbor of San Diego has been surveyed by Captain, Sir Edward Belcher, of the royal navy, whose determination of the longitude of the spit to the south of Punta Loma, published in his "voyage round the world," has been adopted, in the absence of time or instruments to enable me to make the requisite observations.

The longitude of the same point by Malispina 117° 17′, and the chronometric longitude brought by myself from my last station

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over the mountains, where lunar distances were observed, 117° 14′; but I have not hesitated to take the results of Sir Edward Belcher, although I have had no opportunity of seeing his observations.

Malispina's observations were made long since, and the results from the chronometers brought overland by me are liable to objections: first, from the imperfection in the determination of my intermediate stations by lunar distances, and, next, from the disturbances to which the chronometers were subjected in the battle of the 6th December, and the skirmish of the 7th, but more particularly the last, where a sudden charge was made in an open plain on our baggage by the enemy's cavalry.

The harbor was originally explored by Sebastian Vizcaino in 1603, but no settlement was made at San Diego until 1769.

Vessels may ride at anchor in the harbor, perfectly land-locked, but in very heavy southerly gales some inconvenience may be felt by those not provided with good ground tackle, from the immense volumes of kelp driven into the harbor.

The kelp (fucus gigantens) occupies a space in front of the harbor some miles in length and half a mile wide. At a distance, I took the kelp for a low island, but was informed of my error by Captain Schenck, who told me vessels were forced through it in a stiff breeze.

On the morning of the 29th December we marched out of San Diego with the following force:

	Capt.	Lieut.	Sergt.	Corpl.	Bug.	Privates.
Dragoons...............	1	1	2	4	2	47
Sailors acting artillery..	1	1	2	4	–	39
Sailors and marines acting infantry..........	8	10	17	17	–	345
Volunteers.............	3	3	6	–	–	48

Three employés of the topographical engineers, three medical officers, and twenty-five men, Indians, and Californians; the whole divided into four divisions or battalions, commanded respectively by Captain Turner, Lieutenant Renshaw, Lieutenant Zielin, and Captain Gillespie.

Six pieces of artillery, of various calibre, got up with great exertion, under the orders of Commodore Stockton, by Lieutenant Tilghman of the navy, acting as captain of artillery.

A wagon train, consisting of one four-wheel carriage and ten ox carts, under the charge of Lieutenant Minor of the navy. The wagons were heavily laden, and our progress was slow in the extreme. We did not reach the Solidad, the first watering place, till 8 o'clock at night.

I was ordered to ride forward and lay out a defensive camp, hoping to give confidence to the sailors, many of whom were now, for the first time, transferred to a new element.

We soon found their habits of discipline aboard ship made the transition easy, and I speedily arrived at the conclusion that Jack, properly handled, made a very good infantry soldier.

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The plan of the camp being approved, I was directed to make it the habitual order of encamping wherever the configuration of the ground would admit. The plan was the natural one to protect ourselves from the night attacks of the enemy, who were all mounted. The mode in which they designed to make their night attacks was to drive into our camp a manada of wild mares, and then take advantage of the confusion they might create to deliver a charge.

December 30.—We encamped at the rancheria of Alvéar.

December 31.—We encamped at the San Barnardo, having gone in three days only 30 miles. The ground passed over was the same as that described in the last two days of our march into San Diego.

January 1.—To-day we obtained some fresh oxen and a few fresh horses, which enabled us to do better and to make 17 miles before sunset. Our road to-day diverged from that heretofore described, and laid over a rolling country, destitute of water and trees. Cattle were seen, in small numbers, covering the plains in all directions, proving to us that the enemy had found it impracticable to fulfil their boast, that we should not get a hoof from the day we left San Diego.

We pitched our camp at the Indian settlement of Buena Vista, passing by the way a deserted rancheria, where there was a puddle of stagnant water, the only water on the route.

January 2.—Six and a half miles march brought us to the deserted mission of San Luis Rey. The keys of this mission were in charge of the alcalde of the Indian village, a mile distant. He was at the door to receive us and deliver up possession.

There we halted for the day to let the sailors, who suffered dreadfully from sore feet, recruit a little.

This building is one which, for magnitude, convenience, and durability of architecture, would do honor to any country.

The walls are of adobe, and the roofs of well made tile. It was built about sixty years since by the Indians of the country, under the guidance of a zealous priest. At that time the Indians were very numerous, and under the absolute sway of the missionaries. These missionaries at one time bid fair to christianize the Indians of California. Under grants from the Mexican government, they collected them into missions, built immense houses, and commenced successfully to till the soil by the hands of the Indians for the benefit of the Indians.

The habits of the priests, and the avarice of the military rulers of the territory, however, soon converted these missions into instruments of oppression and slavery of the Indian race.

The revolution of 1836 saw the downfall of the priests, and most of these missions passed by fraud into the hands of private individuals, and with them the Indians were transferred as serfs of the land.

This race, which, in our country, has never been reduced to slavery, is in that degraded condition throughout California, and do the only labor performed in the country. Nothing can exceed their present degraded condition.

For negligence or refusal to work, the lash is freely applied, and

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in many instances life has been taken by the Californians without being held accountable by the laws of the land.

This mission of San Luis Rey was, until the invasion of California by the Americans, in 1846, considered as public property. Just before that event took place, a sale was made of it for a small consideration, by the Mexican authorities to some of their own people, who felt their power passing away, and wished to turn an *honest penny* whilst there was power left; but this sale was undoubtedly fraudulent, and will, I trust, not be acknowledged by the American government. Many other missions have been transferred in the same way; and the new government of California must be very pure in its administration to avoid the temptations which these fictitious sales, made by the retiring Mexican authorities, offer for accumulating large fortunes at the expense of the government.

The lands belonging to this mission are extensive, well watered, and very fertile. It is said, and I believe it probable from appearances, that wheat will grow in the valleys adjacent, without irrigation.

January 3.—After marching a few miles the wide Pacific opened to our view. We passed the St. Marguerita rancheria, once a dependency of San Luis Rey, now in the possession of the Pico family. We encamped near Flores, a deserted mission. Just below it, and near the ocean, is an Indian village. Cattle were seen in great numbers to-day, and several well broken pairs of oxen were picked up on the way.

Distance 10.5 miles.

January 4.—After leaving Flores a few miles, the high broken ground projects close in upon the sea, leaving but a narrow, uneven banquette, along which the road wends through a growth of chapparal.

Here we met three persons, bearing a flag of truce; one an Englishman, named Workman, another Fluge, a German, the third a Californian.

They brought a letter from Flores, who signed himself governor and captain general of the department of California, proposing to suspend hostilities in California, and leave the battle to be fought elsewhere between the United States and Mexico, upon which was to depend the fate of California. There was a great deal of other matter in the letter, useless to repeat. The commission returned with a peremptory refusal of the proposition of the governor and captain general Flores.

After going nine miles from Flores, the high land impinges so close on the sea that the road lies along the sea beach for a distance of eight miles. Fortunately for us the tide was out, and we had the advantage of a hard, smooth road. Notwithstanding this, our column stretched out a great distance, and we were compelled to make frequent halts for the rear to come up.

This pass presents a formidable military obstacle, and, in the hands of an intrepid and skilful enemy, we could have been severely checked, if not beaten back from it; but we passed unmolested, and encamped late at night on an open plain at the mouth

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of the stream leading from the mission of San Juan de Capristano, and about two miles from the mission.

It was so dark I could not see to lay off the lines of the camp accurately, and I was glad, in the morning, that an early start gave no time for criticism. Distance 18.8 miles.

January 5.—The mission of San Juan has passed into the hands of the Pico family. The cathedral was once a fine strong building, with an arched cupola; only one-half of the building, capped by a segment of the cupola, is now standing, the other part having been thrown down by an earthquake in the year 1822, killing some thirty or forty persons who had fled to it for refuge.

Attracted by a house having a brush-fence round the door, as if to keep out intruders, I was told there were four men within, in the agonies of death, from wounds received at the battle of San Pasqual.

We moved to the Alisos (Sycamore) rancheria, where we found a spring of good water, but nothing to eat. Through the kindness of Mr. Foster, an Englishman, we received here a supply of fresh horses.

The road was principally through the valley of the stream watering the mission. On each side were beautiful rounded hills, covered with a delicate tinge of green from the grass, which was now sprouting freely near the sea-coast.

Up to this point, except a small patch at Flores, I had not seen the mark of a plough or any other instrument of husbandry. The rancherias were entirely supported by rearing cattle and horses. Distance 11.1 miles.

January 6.—To-day we made a long march of 19 miles to the upper Santa Anna, a town situated on the river of the same name. We were now near the enemy, and the town gave evidence of it. Not a soul was to be seen; the few persons remaining in it were old women, who, on our approach, had bolted their doors. The leaders of the Californians, as a means of inciting their people to arms, made them believe we would plunder their houses and violate their women.

Taking advantage of a deep ditch for one face of the camp, it was laid off in a very defensible position between the town and the river, expecting the men would have an undisturbed night's rest, to be in the morning ready for the fight, which might now be expected daily. In this hope we were mistaken. The wind blew a hurricane, (something very unusual in this part of California,) and the atmosphere was filled with particles of fine dust, so that one could not see and but with difficulty breathe.

January 7.—The wind continued to blow violently, which the enemy should have taken advantage of to attack us. Our weapons were chiefly fire-arms; his, the lance; and I was quite certain that in such a gale of wind as then blew, the difficulty of loading our arms would have proved a serious matter.

The Santa Anna is a fine, dashing stream, knee-deep, and about 100 yards wide, flowing over a sandy bed. In its valley are many valuable vineyards and corn fields. It is capable of affording water to a great many more. On its banks are considerable tracts

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SKETCH of the PASSAGE
OF THE
RIO SAN GABRIEL
UPPER CALIFORNIA
by the
Americans, discomfiting
the opposing Mexican Forces
JANUARY 8TH 1847.

UNIV. OF MICH.
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of uncultivated land within the level of irrigation. We now began to think there would be more formidable and united resistance by the enemy, but he failed to show himself; and such was the unanimity of the men, women and children, in support of the war, that not a particle of information could be obtained in reference to his force or position.

After travelling ten miles we came to the Coyotes, a rancheria owned by a rich widow lady, who had just married a handsome young fellow, who might well pass for her son. These people we found at home, and we learned from them that the enemy intended to give us battle the next day. Indeed, as we approached the rancheria, several horsemen drew off, reconnoitring us so closely as to make it doubtful if they were not some of our own vaqueros.

January 8.—We passed over a country destitute of wood and water, undulating and gently dipping towards the ocean, which was in view. About two o'clock we came in sight of the San Gabriel river. Small squads of horsemen began to show themselves on either flank, and it became quite apparent the enemy intended to dispute the passage of the river.

Our progress was necessarily very slow, our oxen being poor, and our wagons (the ox-carts of the country) with wheels only about two feet in diameter.

The enemy did not yet discover his order of battle, and we moved to the river in our habitual order of march, when near the enemy, viz: the 2d division in front, and the 1st and third on the right and left flanks respectively; the guard and a company of volunteer carbiniers in the rear; our cattle and the wagon train in the centre, making for them, what the sailors wittily termed, a Yankee corral. The artillery were distributed on the four angles of the rectangle.

This order of march was adopted from the character of the enemy's force, all of which was mounted; and in a measure from our own being men unaccustomed to field evolutions, it was necessary to keep them habitually in the order to resist cavalry attacks when in view of the enemy. We had no cavalry, and the object of the enemy was to deprive us of our cattle by sudden charges.

The river was about 100 yards wide, knee-deep, and flowing over quick-sand. Either side was fringed with a thick undergrowth. The approach on our side was level; that on the enemy's was favorable to him. A bank, fifty feet high, ranged parallel with the river, at point blank cannon distance, upon which he posted his artillery.

As we neared the thicket, we received the scattering fire of the enemy's sharp shooters. At the same moment, we saw him place four pieces of artillery on the hill, so as to command the passage. A squadron of 250 cavalry just showed their heads above the hill, to the right of the battery, and the same number were seen to occupy a position on the left.

The 2d battalion was ordered to deploy as skirmishers, and cross the river. As the line was about the middle of the river, the enemy opened his battery, and made the water fly with grape and round shot. Our artillery was now ordered to cross—it was unlimbered, pulled over by the men, and placed in counter battery on the ene-

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my's side of the river. Our people, very brisk in firing, made the fire of the enemy wild and uncertain. Under this cover, the wagons and cattle were forced with great labor across the river, the bottom of which was quick sand.

Whilst this was going on, our rear was attacked by a very bold charge, and repulsed.

On the right bank of the river there was a natural banquette, breast high. Under this the line was deployed. To this accident of the ground is to be attributed the little loss we sustained from the enemy's artillery, which showered grape and round shot over our heads. In an hour and twenty minutes our baggage train had all crossed, the artillery of the enemy was silenced, and a charge made on the hill.

Half way between the hill and the river, the enemy made a furious charge on our left flank. At the same moment, our right was threatened. The 1st and 2d battalions were thrown into squares, and after firing one or two rounds, drove off the enemy. The right wing was ordered to form a square, but seeing the enemy hesitate, the order was countermanded; the 1st battalion, which formed the right, was directed to rush for the hill, supposing that would be the contested point, but great was our surprise to find it abandoned.

The enemy pitched his camp on the hills in view, but when morning came, he was gone. We had no means of pursuit, and scarcely the power of locomotion, such was the wretched condition of our wagon train. The latter it was still deemed necessary to drag along for the purpose of feeding the garrison, intended to be left in the Ciudad de los Angeles, the report being that the enemy intended, if we reached that town, to burn and destroy every article of food. Distance 9.3 miles.

January 9.—The grass was very short and young, and our cattle were not much recruited by the night's rest; we commenced our march leisurely, at 9 o'clock, over the "Mesa," a wide plain between the Rio San Gabriel and the Rio San Fernando.

Scattering horsemen, and small reconnoitring parties, hung on our flanks. After marching five or six miles, we saw the enemy's line on our right, above the crest made by a deep indentation in the plain.

Here Flores addressed his men, and called on them to make one more charge; expressed his confidence in their ability to break our line; said that "yesterday he had been deceived in supposing that he was fighting soldiers."

We inclined a little to the left to avoid giving Flores the advantage of the ground to post his artillery; in other respects we continued our march on the Pueblo as if he were not in view.

When we were abreast of him, he opened his artillery at a long distance, and we continued our march without halting, except for a moment, to put a wounded man in the cart, and once to exchange a wounded mule, hitched to one of the guns.

As we advanced, Flores deployed his force, making a horse shoe in our front, and opened his nine-pounders on our right flank, and two smaller pieces on our front. The shot from the nine-pounders

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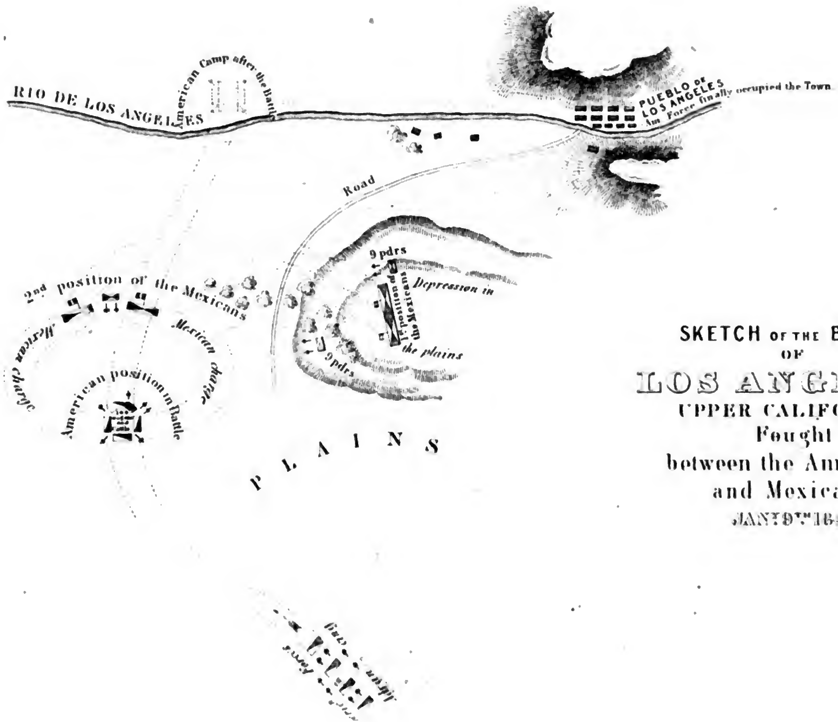

SKETCH OF THE BATTLE
OF
LOS ANGELES
UPPER CALIFORNIA
Fought
between the Americans
and Mexicans
JANY 9TH 1847.

UNIV. OF MICH.

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on our flank was so annoying that we halted to silence them. In about fifteen minutes this was done, and the order "forward" again given, when the enemy came down on our left flank in a scattering sort of charge, and notwithstanding the efforts of our officers to make their men hold their fire, they, as is usually the case under similar circumstances, delivered it whilst the Californians were yet about a hundred yards distant. This fire knocked many out of their saddles, and checked them. A round of grape was then fired upon them, and they scattered. A charge was made simultaneously with this on our rear, with about the same success. We all considered this as the beginning of the fight, but it was the end of it. The Californians, the most expert horsemen in the world, stripped the dead horses on the field, without dismounting, and carried off most of their saddles, bridles, and all their dead and wounded on horseback to the hills to the right.

It was now about three o'clock, and the town, known to contain great quantities of wine and aguardiente, was four miles distant. From previous experience of the difficulty of controlling men when entering towns, it was determined to cross the river San Fernando, halt there for the night, and enter the town in the morning with the whole day before us. The distance to-day, 6.2 miles.

After we had pitched our camp, the enemy came down from the hills, and 400 horsemen, with the four pieces of artillery, drew off towards the town, in order and regularity, whilst about sixty made a movement down the river, on our rear and left flank. This led us to suppose they were not yet whipped, as we thought, and that we should have a night attack.

January 10.—Just as we had raised our camp, a flag of truce, borne by Mr. Selis a Castilian, Mr. Workman an Englishman, and Alvarado the owner of the rancheria at the Alisos, was brought into camp. They proposed, on behalf of the Californians, to surrender their dear City of the Angels, provided we would respect property and persons. This was agreed to; but not altogether trusting to the honesty of General Flores, who had once broken his parole, we moved into the town in the same order we should have done if expecting an attack.

It was a wise precaution, for the streets were full of desperate and drunken fellows, who brandished their arms and saluted us with every term of reproach. The crest, overlooking the town, in rifle range, was covered with horsemen, engaged in the same hospitable manner. One of them had on a dragoon's coat, stolen from the dead body of one our soldiers after we had buried him at San Pasqual.

Our men marched steadily on, until crossing the ravine leading into the public square, when a fight took place amongst the Californians on the hill; one became disarmed, and to avoid death rolled down the hill towards us, his adversary pursuing and lancing him in the most cold-blooded manner. The man tumbling down the hill was supposed to be one of our vaqueros, and the cry of "rescue him" was raised. The crew of the Cyane, nearest the scene, at once, and without any orders, halted and gave the man that was

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lancing him a volley, strange to say he did not fall. Almost at the same instant, but a little before it, the Californians from the hill did fire on the vaqueros. The rifles were then ordered to clear the hill, which a single fire effected, killing two of the enemy. We were now in possession of the town; great silence and mystery was observed by the Californians in regard to Flores; but we were given to understand that he had gone to fight the force from the north, drive them back, and then starve us out of the town. Towards the close of the day we learned very certainly that Flores, with 150 men, chiefly Sonorians, and desperadoes of the country, had fled to Sonora, taking with him four or five hundred of the best horses and mules in the country, the property of his own friends. The silence of the Californians was now changed into deep and bitter curses upon Flores.

Some slight disorder took place among our men at night, from the facility of getting wine, but the vigilance of the officers soon suppressed it.

January 11.—It rained in torrents all day. I was ordered to select a site, and place a fort, capable of containing a hundred men; with this in view, a rapid reconnoissance of the town was made, and the plan of a fort sketched, so placed as to enable a small garrison to command the town and the principal avenues to it. The plan was approved. Many men came in during the day and surrendered themselves.

January 12.—I laid off the work, and, before night, broke the first ground. The population of the town, and its dependencies, is about 3,000; that of the town itself, about 1,500. It is the centre of wealth and population of the Mexico Californian people, and has heretofore been the seat of government. Close under the base of the mountains, commanding the passes to Sonora, cut off from the north by the pass at San Barbara, it is tne centre of the military power of the Californians. Here all the revolutions have had their origin, and it is the point upon which any Mexican force from Sonora would be directed. It was therefore desirable to establish a fort, which, in case of trouble, should enable a small garrison to hold out till aid might come from San Diego, San Francisco, or Monterey, places which are destined to become centres of American settlements.*

January 13.—It rained steadily all day, and nothing was done on the work; at night I worked on the details of the fort.

Thursday 14.—We drank to-day the wine of the country, manufactured by Don Luis Vigne, a Frenchman. It was truly delicious, resembling more the best description of Hock than any other wine.

Many bottles were drunk, leaving no headache or acidity on the stomach. We obtained, from the same gentleman, a profusion of grapes and luscious pears, the latter resembling in color and taste the Bergamot pear, but different in shape, being longer and larger.

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* Subsequently to my leaving the Ciudad de los Angeles, the entire plan of the fort was changed, and I am not the projector of the work finally adopted for the defence of that town.

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January 15.—The details to work on the fort were by companies. I sent to Captain Tilghman, who commanded on the hill, to detach one of the companies under his command to commence the work. He furnished, on the 16th, a company of artillery (seamen from the Congress,) for the day's work, which they performed bravely, and gave me great hopes of success.

January 18, 19, *and* 20.—I received special orders which separated me from the command, and the party of topographical engineers that had been so long under my orders.

The battles of the 6th December, and the 8th and 9th January, had forever broken the Mexican authority in California, and they were daily coming in, in large parties, to sue for peace, and every move indicated a sincere desire on the part of the more respectable portion of the Californians to yield without further struggle to the United States authorities; yet small parties of the more desperate and revengeful hung about the mountains and roads; refusing or hesitating to yield obedience to their leaders, who now, with great unanimity, determined to lay down their arms. General Flores, with a small force, was known to have taken the road to Sonora, and it was believed he was on his way to that province, never to return to California.

Leaving General Kearny at San Juan de Capristano, on his return to San Diego, I took three men and pushed on for the latter place. Halting late in the evening at the deserted Indian rancheria of Santa Margarita, we broke open one of the Indian huts, and got *some corn* and pumpkins for our animals. When night came on, the number of insects about the hut, and the intolerable noise made by the wolves, kept us from sleep. The moon shone brightly, and about ten at night we saddled up to pursue our journey.

In this determination we were confirmed by the unexplained movement of several small parties of mounted Californians that reconnoitred our camp; a circumstance which afforded additional proof that some of the Californians were yet in arms, and led us very reasonably to the conclusion that our only safety was in changing our camp. We reached the mission of San Luis Rey, and found not a human being stirring The immense pile of building, illuminated by the pale cold rays of the moon, stood out in bold relief on the dim horizon; a monument of the zeal of the indefatigable priests, by whom it was built. Now untenanted and deserted, it offered no resting place for the weary and hungry, and we rode on, determined to halt at the first place where grass should be in abundance.

The road here divides into two branches; one leads to the west, by the rancheria of San Barnardo, the other directly to San Diego, over the high lands, running nearly parallel to the sea coast. The first is that by which we had marched on the Pueblo de los Angeles, fearing that the hills on the sea coast road would embarrass the movement of our artillery and ox carts.

Without a guide, we had great difficulty in striking at night the trail leading over the mountains; but consulting the stars for our course, and relying upon the sagacity of my three men, who had

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passed most of their days in traversing untrodden regions, we jogged along, shivering with the cold air of the elevated hills.

About twelve, we came to a large patch of luxuriant grass, wet with dew. Upon this we loosened our animals and attempted to get a little sleep, but, in the absence of blankets or fire, the cold deprived us of repose, and the dawn of day found us again in our saddles.

The only habitation on the road from San Luis Rey to San Diego is a hut about half way, where there is a good spring. Its occupants had just returned from the wars, quite as hungry as we were. They had preceded us not more than twenty minutes, yet they had a fat bullock killed, and choice bits of his flesh roasting before the fire. We outnumbered the party, and consequently received their hospitality, which was extended to us with a good deal of bonhommie.

They conversed freely of the battles fought but a few days before, acknowledged their participation in them, and expressed themselves satisfied of the uselessness of farther resistance without aid from Mexico.

The fresh meat of a bullock is all that is required by the Californian for breakfast, dinner, and supper.

Bread, tea, and coffee are rarely, if ever, used, and even when within their reach, looked upon with indifference.

We very soon fell into their habits, and it is probable the troops in California, at this time, would not consider it an excessive hardship to make a campaign with no other stores in the commissariat than a plentiful supply of fresh beef. The white teeth of the Californians, and the blood tingling in the cheeks of their olive colored faces would seem to prove this beef to be a very healthy diet.

The advantages in the movement of troops that are contented with this kind of subsistence is very great, enabling them to move without wagons, and with no other care for the morrow than herding the animals intended for food.

Our host was so well pleased with the manner in which we acquitted ourselves at his rude repast, that forgetting old animosities, he saddled up his jaded horse, and piloted us for five or six miles, until we reached the broad trail, leading to the Solidad.

About midday we reached San Diego, and next morning taking leave of my men and the animals that had done us such good service, I embarked on board the prize brig Malek Adhel, commanded by Lieutenant Schenck, of the navy, and prepared to take my leave of Upper or Alta California. Before doing so, however, I may venture upon a few general remarks, based upon personal observations, upon the topography, climate, and products of that portion of the country not covered by my survey, or that of others. These observations were made after I had become separated from my assistants and instruments, my mind being engrossed with other subjects. The information contained in them is, therefore, less precise than that contained in other portions of my journal.

The region, extending from the head of the Gulf of California to the parallel of the Pueblo, or Ciudad de los Angeles, is the only portion not heretofore covered by my own notes and journal, or by

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the notes and journals of other scientific expeditions fitted out by the United States.

The journals and published accounts of these several expeditions combined, will give definite ideas of all those portions of California susceptible of cultivation or settlement. From this remark is to be excepted the vast basin watered by the Colorado, and the country lying between that river and the range of Cordilleras, represented as running east of the Tulare lakes, and south of the parallel of 36°, and the country between the Colorado and Gila rivers.

Of these regions nothing is known except from the reports of trappers, and the speculations of geologists. As far as these accounts go, all concur in representing it as a waste of sand and rock, unadorned with vegetation, poorly watered, and unfit, it is believed, for any of the useful purposes of life. A glance at the map will show what an immense area is embraced in these boundaries; and, notwithstanding the oral accounts in regard to it, it is difficult to bring the mind to the belief in the existence of such a sea of waste and desert; when every other grand division of the earth presents some prominent feature in the economy of nature, administering to the wants of man. Possibly this unexplored region may be filled with valuable minerals.

I have alluded, elsewhere, to the population of this country, the savage character of which is another obstacle to its exploration, and has tended to veil in mystery its true character and resources.

Alta California, between the 31st and 34th parallels of latitude, presents to the eastern man, accustomed to navigable rivers and broad estuaries of the ocean, topographical features of a very unusual character.

Two chains of mountains traverse the country in a direction nearly parallel to the sea coast, slightly converging towards each other, and finally uniting near the parallel of 32°. Here they form the promontory of Lower California, extending its entire length, and terminating abruptly in the ocean, at Cape San Lucas.

The first chain (that nearest the coast) may be considered a steppe of the second or interior range of mountains. It impinges on the coast at three different points, Santa Barbara, San Juan de Capristano, and between San Luis Rey and San Diego—at the first two places with so much boldness as to make it necessary to conduct the road along the margin of the sea, between the lines of high and low water mark, so that both Santa Barbara and San Juan present points worthy of consideration to the military commandant charged with the defence of that country.

Between the first and second ranges of mountains there is a valley, traversed by a good road, leading directly from the great desert to the Pueblo de los Angeles, and a defending force would meet its adversary to the greatest advantage at Cariso Creek, the termination of the "jornada" across the desert. The description and locality of Cariso Creek has already been given.

The second or principal range of mountains lies at no great distance from the first, and the valley between offers some arable land. The distance between the first range and the sea coast varies from

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1 to 20 or 30 miles. The surface covered with vegetation, thoug small, is difficult to estimate; and perhaps it is unimportant tha an estimate should be made, since the productiveness of these re gions depends on other considerations than smoothness of surface and character of soil. The rains cannot be relied upon, and th tiller of the earth depends upon irrigation from the mountai streams for his crops. The extent of ground, capable of tillage is thus reduced to very narrow limits, easy of computation. A knowledge of the water courses, their fall, volume and extent, and the quantity of lands on their margin, within the level of these waters, are the data upon which the computation must be based.

Taking this as a guide, an inspection of the accompanying maj will give a general idea of the extent of arable ground, sufficientl correct for all practical purposes; but, in candor it should be said that many streams laid down in it disappear in the sand, while th rocky cliffs, forming the banks of others, render irrigation im practicable. The scale upon which the map is projected is too smal to represent these accidents of the ground.

Where irrigation can be had in this country, the produce of th soil is abundant beyond description. All the grains and fruits o the temperate zones, and many of those of the tropical, flourisl luxuriantly.

Descending from the heights of San Barnardo to the Pacific, one meets every degree of temperature. Near the coast, the winds prevailing from the southwest in winter, and from the northwest ir summer, produce a great uniformity of temperature, and the climate is perhaps unsurpassed in salubrity. With the exception of a very few cases of ague and fever of a mild type, sickness is unknown.

The season of the year at which we visited the country was unfavorable to obtaining a knowledge of its botany. The vegetation, mostly deciduous, had gone to decay, and no flowers nor seeds were collected. The country generally, is entirely destitute of trees. Along the principal range of mountains are a few live oaks, sycamore, and pine; now and then, but very rarely, the sycamore and cotton wood occur in the champaign country, immediately on the margins of the streams.

Wild oats every where cover the surface of the hills, and these, with the wild mustard and carrots, furnish good pasturage to the immense herds of cattle, which form the staple of California.

Of the many fruits capable of being produced with success, by culture and irrigation, the grape is perhaps that which is brought nearest to perfection.

Men experienced in growing it, and Europeans, pronounce the soil and climate of this portion of California, unequalled for the quality of the grape and the wine expressed from it.

We sailed from San Diego on the 25th of January, and coasted along the rocky and barren shores of Lower California. The information in reference to this country, which it was in my power to obtain, is not so precise as that which might be derived from an actual survey, and I have therefore embodied it in the appendix.

I have the honor to be, very respectfully, yours,

W. H. EMORY.

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APPENDIX No. 1.

New York, *October* 1, 1847.

Dear Sir: I return you my thanks for the very interesting information contained in your letter of the 20th of September.*

It unfortunately happens that I cannot wait for the arrival of your papers, or for the publication of the map of the War Department. My essay makes part of the second volume of the transactions of the New York Ethnological Society. The work is now in the press, completed with the exception of my essay; and the printer presses me for it. The map, which will acco , pany it, is principally intended to show the original abodes of the Indian tribes. It will be presented as a sketch, without pretensions to accurate correctness. But there is a consideration, which makes me anxious to obtain every possible information respecting the Rio Gila, and especially its upper waters.

You may not be aware that a work has lately been recovered and published, which contains a full and authentic account of an expedition in the year 1540–1542, by order of the viceroy Mindoça, and under the conduct of Vasquez Coronado. It consisted of 350 Spaniards and 800 Indians. Setting off from Culiacan, they reached the sources of the Rio Gila, passed across the mountains to the Rio del Norte, wintered twice in the province now called New Mexico, explored it through its whole length, from north to south, and afterwards, taking a northeast course, crossed the mountains, reached the buffalo plains, through which they wandered a considerable distance eastwardly, and as far north as the 40th degree of latitude. Finding no gold, they returned to Mexico. The Spaniards did not re-enter the country till the year 1581; and the conquest of New Mexico was not completed till about the year 1595.

The veracity of the narrator, Castenador, who was a volunteer in the expedition, and who wrote the account twenty years after, is fully established by a variety of circumstances, too multiplied to be inserted here. It is sufficient to say, that the Indians of the Rio Gila, and of the upper valley of the Rio del Norte, were an agricultural people, cultivating maize, beans, pumpkins, and cotton; depending exclusively on agriculture for their subsistence, dwelling in villages built of mud, (torchis,) mixed with certain balls of hardened matter, and well cemented together. The houses were generally four stories high, with no opening on the first floor, accessible only by moveable ladders, with top terraces, and an under ground apartment occupied exclusively by the men, and used as *estufas;*

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* This letter gives a general outline of the route, and twenty words of the Coco Marikopas language, and a few of the Pimos.

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in short, similar in every respect to the existing pueblos of New Mexico, and to the ruins of the Casas Grandes described, as I think, erroneously to the Aztecs.

With respect to New Mexico, one principal want is that of vocabularies, which would at once settle the question of identity with any of the Mexican nations. The same difficulty exists with respect to all the tribes of the country drained by the great Rio Colorado of the west. But there is an additional embarrassment respecting the actual situation of what were called the seven villages of Cibala; of which we can only say, that they were situated in a narrow valley six leagues long, and on the very sources of some one branch of the Rio Gila.

The phenomenon of this insulated semi-civilized population, is in itself remarkable, and difficult to be explained; and the discovery of the precise spot, where the seven Cibala villages were situated, is especially desirable. With this object in view, I beg leave to submit to you the following queries.

1st. On leaving the copper mines, on the 18th of October, and after having crossed the Sierra Mimbres, you reached the main branch of the river Gila on the 20th; now what I wish to know, is, from what quarter did that main branch come, or in other words, if you had ascended that main branch, what was its apparent course? What was the distance from the western foot of the Sierra Mimbres to that main branch where you struck it? Did you, along that distance, cross any tributary streams of the Rio Gila, and from what quarter did they come?

2d. Can you furnish me with the approximate latitude of some of the principal points observed when descending the river; principally the junction of the Salmas, the village of the Pimos Indians, any other spot where evident traces of ruins were discovered, and the mouth of the river Gila. From what quarter did the river Salmas come? Did you carry time with you, so as to obtain the relative longitude of some points? The most important would be the spot where you left the Rio del Norte, that where you struck the main branch of the Gila, the mouth of the Salmas, the Pimos village, and the mouth of the Rio Gila. If you had no other means, still your travelled distance may give a rough approximation.

It seems to me that the easiest way to answer these two queries, would be a rough approximate sketch of the country traversed by you. I will take special care not to commit you in any way. I am no plagiarist, and I must in general terms acknowledge that I am indebted to you for some important information; but I will at the same time refer to your intended complete report and map, which will give that precise information which was not within my reach.

3d. You did not visit the mouth of the great Rio Colorado: but General Kearny states in his letter that the mouth of the Gila was in about latitude 32°; that he crossed the Colorado ten miles below, and marched near it for thirty miles, when he left it, (turning off eastwardly across the desert,) without having reached its mouth. Now the generality of our maps place the mouth of the Colorado

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SAN DIEGO FROM THE OLD FORT

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in latitude 32°, and it is clear from what precedes, that it must be nearly one degree further south. Do you think that I may in my sketch set it down at about latitude 31°?

4th. The cultivation of cotton is one of great general importance. As now informed, I believe that, independent of varieties, there are but two distinct species: the black seed, which is the native American, and found as such no where else, and the green seed, which adheres to the staple, of Asiatic origin, thence brought to the Levant and the Mediterraenean, and imported into North America, of which it was not a native. I cannot obtain in this city a copy of Bomplant's great botanical work, which would have thrown much light on the subject. I wish now to know, whether you took any notice of the cotton cultivated by the Pimos, and what species it was? I presume that it was not a native of that region, and that the seed must have been imported from Mexico.

I now proceed to that which relates to the Indians, who are the principal objects of my researches.

1st. I have compared your vocabulary of the Coco Maricopas with those of the four Mexican languages in my possession, and of thirty-two well ascertained families of Indians, living within the United States or further north, and have found no resemblance with either. It is to me a quite new language, but there is a remarkable word. *Apache* is the word for *man;* and judging by analogy from several other Indian languages, they should be Apaches or belonging to that family. Thus, for instance, amongst the Algonquin tribes, the names assumed by two of them, Illinois and Linno Linap, are evidently derived from Linno, a man. However this may be, I wish to have some further information respecting that tribe; to know with as much precision as you can, the quarter whence they came; their present location in reference to the Pimos, and particularly whether and what they do cultivate; also, whether they are wilder than the Pimos, and whether on good terms with them.

2d. You say that the accounts, by report, of the Indians to the mouth of the Gila are conflicting and of an indefinite character. This observation applies to every information derived from other sources. We have as yet only vague rumors. Yet I wish to collect all these, as far as possible. A few legitimate inferences may, perhaps, be drawn by comparing them together; but it is principally for the purpose of enabling me to point out the most important objects of inquiry that I wish to be thus informed. You will, therefore, oblige me by communicating such rough notes as you may have taken on that subject, and also what were the abodes and occupations of the few scattered Indians whom you met on your journey.

(a.) Have you, by any direct observation, ascertained within 30′ the positive longitude, in reference to Greenwich, of any point on the Rio del Norte or vicinity which may serve as a starting point?

There must be some kind of a dividing ridge which separates the waters of the river Gila from the waters that empty into the gulf of California. From what you say of Colonel Cooke's route, I would infer that he left the Rio Norte a short distance above El

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Passo, and that he must have travelled south of that ridge, in an almost due west course to the Rio Colorado.

I use the word "Sierra Madre" in the sense attached to it by the Mexicans, viz: that ridge which separates the waters that fall into the Atlantic from the rivers which empty into the Pacific ocean, without any regard to its elevation.

I pray you to accept the assurances of my distinguished consideration and personal regard.

Your most obedient and faithful servant,

ALBERT GALLATIN.

To Lieutenant W. H. Emory,
U. S. Topographical Engineers, Washington.

Washington, *October* 8, 1847.

Dear Sir: In answer to your letter of the 1st instant, I have the pleasure to send you, with the permission of the chief of my department, a table of twenty-three geographical positions determined by myself, which you are at liberty to use; and, should you think the information of sufficient importance, I should feel much flattered that you should, as you propose, communicate them to the Ethnological Society of New York for publication.

No astronomical observations, that I am aware of, have ever before been made on the same grounds, if we except the observations of Dr. Coulter at the mouth of the Gila, which have never yet been published.

You will see that the position of the Gila is very much changed, as well as that of Santa Fé, in New Mexico.

The observations were made with an 8½ inch sextant, constructed by the celebrated Gambey, of Paris. In most cases, the determinations of the places in latitude are the mean of the results obtained by many observations on north and south stars, of nearly equal altitudes, by which the errors of eccentricity, &c., in the instrument were avoided.

The longitudes are derived from a combination of the results from the chronometers, and measurement of distances between the moon and stars, nearly equi-distant on either side of it.

The chronometers used were two very good box chronometers, by Parkinson & Frodsham, (Nos. 783 and 2075.)

The observations themselves, including those between Santa Fé and Fort Leavenworth, (our point of departure,) in number 2,500 or 3,000, were all computed in the field, and are now undergoing verification by Professor Hubbard, a very accurate young computer, attached to the observatory at Washington.

The computations for all the points embraced in the table sent you, have been verified.

The objects of our expedition being purely military, the subjects of interest to scientific men were only pursued so far as they were incidental to the expedition, and did not interfere with its great object. The instruments with which I was furnished were not those,

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perhaps, which I would have selected; at the same time there was nothing for me to regret, except the absence of a good portable telescope, with which occultations of the fixed stars by the moon, and the immersion of Jupiter's satellites, could have been observed, and a few pocket chronometers.

We left Washington on twenty-four hours' notice, and time was not allowed to procure either the telescope or pocket chronometers.

1st. We struck the Gila, as the table will show, in latitude 32° 44′ 52″ and longitude 108° 45′ west from Greenwich; thence its course is very nearly west. As well as we could judge from the course of the mountains, its course from that point to its source was not very far from northeast or southwest.

No tributaries to the Gila were crossed before reaching it, except one named by me Night creek, a very insignificant stream. The Sierra Mimbres, 6,000 feet above the sea at the highest point where we crossed it, falls gradually and almost imperceptibly to the Gila.

2d. Your second interrogatory is answered principally, by the table of geographical positions.

The Rio Salinas comes in from the *northeast*, a little west and north of camp 97, of November 12. (See table.) This camp, the astronomical position of which is given in the table, is about midway between the villages of the Pimos and Coco Marricopas Indians.

3d. The table will show you that the junction of the Gila and Colorado is on the parallel of 32° 43′ or 4′; and, in the absence of more specific information, I would advise you to place the mouth of the Colorado on the parallel of 31° 51′, which is the latitude given it by Lieutenant Hardy, of the royal navy, whose little book of travels in Mexico you have no doubt seen.

4th. Specimens of the seed of the cotton grown by the Pimos were obtained, but they have not yet reached me. Overcoming space was the great object we had in view when we passed the Pimos, and our investigations and collections were necessarily hasty and superficial. We passed with them only the part of a day, whereas, if exploration alone had been the object of our party, I should have considered a week as little enough to have devoted to this interesting people. When I left California, it was as a special envoy to the government, and on so short a notice that many of my collections and notes were left behind, with my assistants. Among the things so left, were the seed of the cotton.

Most of the plants collected, however, were brought home. These will show a very complete history of the botany of the country. They are in the hands of Doctor Torrey, who is preparing an elaborate catalogue and drawings of those plants, heretofore unknown. This catalogue I should be very glad to place at the disposal of your society.

The Coco Marricopas Indians come from the West. So late as 1826, Mr. Kit Carson, one of our guides, met these people at the mouth of the Colorado. Subsequently to that period, they were visited by Dr. Anderson (whom we met in Santa Fé) at a point

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about half way between their present village and the mouth of the Gila river.

They are taller and more athletic than the Pimos, and what struck me as very remarkable, the men had generally aquiline noses, whilst those of the women were retroussérs.

They occupy thatched cottages, thirty or forty feet in diameter, made of the twigs of cotton wood trees, interwoven with the straw of wheat, corn stalks, and cane.

Cotton, wheat, maize, beans, pumpkins, and watermelons are the chief agricultural products of these people. Their fields are laid off in squares, and watered, by the Zequias, from the Gila river. Their implements of husbandry are the wooden plough, the harrow, and the cast-steel axe, (procured probably from Sonora.) They have but few cattle, and not many horses. I observed, domesticated among them, ducks, chickens, and pigs. They had many ornaments of sea-shells, showing, in my opinion, their recent migration from the gulf. From the character given of them by Carson, when he saw them in 1826, although they were then an agricultural people, I should think they had learned much by their proximity to their neighbors, the Pimos, whom they acknowledge as politically their superiors, and with whom they live on terms of intimate and cordial friendship.

The Marricopas impressed me as a more sprightly race than the Pimos; the interpreters of the Pimos were all natives of the Marricopas band.

The dress of both nations or bands was the same. That of the men a breech cloth and a cotton serape of domestic manufacture; that of the women the same kind of serape pinned around the waist and falling below the knees, leaving the breast and arms bare.

Both nations cherished an aversion to war, and a profound attachment to all the peaceful pursuits of life. This predilection arose from no incapaciiy for war, for they were at all times able and willing to keep the Apaches, whose hands are raised against all other people, at a respectful distance, and prevent depredations by those mountain robbers, who hold Chihuahua, Sonora, and a part of Durango in a condition approaching almost to tributary provinces.

They have a high regard for morality, and punish transgressions more by public opinion than by fines or corporeal punishments. Polygamy is unknown amongst them, and the crime of adultery, punished with such fearful penalties amongst Indian nations generally, is here almost unknown, and is punished by the contempt of the relatives and associates of the guilty parties.

The Indians we met between the Del Norte and the Pimos settlement were mostly wild Indians of the great Apache nation, which inhabits all the country north and south of the Gila, and both sides of the Del Norte, about the parallel of the Jornada and Dead Man's lakes.

They have no fixed habits, and the only vestiges of their abodes which we saw were temporary sheds, a few feet high, made of the

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twigs of trees. They live principally by plundering the Mexicans of New Mexico, Chihuahua, Sonora, and Durango.

No vocabulary of their language was procured. I am inclined to think they extend up to the head waters of the Gila.

Beyond them to the north is the warlike nation of the Navajoes, who, Mr. Fitzpatrick thinks, are allied to the Crow Indians.

Near the head waters of the Salinas, which runs in a course, it is said, nearly northeast and southwest, is a band of Indians called the Soones, who, in manners, habits, and pursuits, are said to resemble the Pimos, except that they live in houses scooped from the solid rock. Many of them are Albinos, which may be the consequence of their cavernous dwellings. Surrounded by the warlike Navajoe, and the thieving Apache, they nevertheless till their soil in peace and security.

Coming farther east, we reach the San José, a tributary to the Puerco, which is tributary to the Rio del Norte from the *west*, not the Rio Puerco represented on the map to flow into the Del Norte south of El Passo.

Here is an Indian race living in four story houses, built upon rocky promontories inaccessible to a savage foe, cultivating the soil and answering the description of the seven cities of Vasquez Coronado, except in their present insignificance in size and population, and the fact that the towns, though near each other, are not in "a (continuous) valley six leagues long," but on different branches of the same stream. The names of these towns are Cibolleta, Moquino, Pojuato, Covero, Acona, Laguna, Poblacon; the last a ruin.

I did not visit these towns in person; but I hope to get a minute description from one who did, and, should I succeed, it will be sent to you.

The work you mention, of Castenada, has never been seen by me. My own impression, and it is so stated in my journal, is that the many ruins we saw on the Gila might well be attributed to Indians of the races we saw in New Mexico, and on the Gila itself. I mean by the last, the Pimos, who might easily have lost the art of building adobe or mud houses. In all respects, except their dwellings, they appeared to be of the same race as the builders of the numberless houses now level with the ground on the Gila river.

The implement for grinding corn, and the broken pottery, were the only vestiges of the mechanical arts which we saw amongst the ruins, with the exception of a few ornaments, principally immense well turned beads, the size of a hen's egg.

The same corn grinder and pottery are now in use among the Pimos. The corn grinder is merely a large stone, well worn, slightly concave, and another of different shape, convex, intended to fit the first and crush the corn between by the pressure of the hand.

The ruins on the Gila were first seen at camp 81, the position of which is shown in the table, from thence to the Pimos village. Wherever the mountains did not impinge too close on the river and shut out the valley, they were seen in great abundance, enough, I should think, to indicate a former population of at least one hun-

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dred thousand; and in one place, between camps 91 and 97, there is a long wide valley, twenty miles in length, much of which is covered with the ruins of buildings and broken pottery.

These ruins are uniformly of the same kind; not one stone now remains on the top of the other; and they are only discoverable by the broken pottery around them, and stone laid in regular order, showing the trace of the foundation of a house.

Most of these outlines are rectangular, and vary from 40 × 50 to 200 and 400 feet front. The stone are unhewn, and are most of an amygdaloid, rounded by attrition.

Now of the tributaries which come into the Gila from the north, there are several besides the Salinas, which, at their mouths, are insignificant in size and can be stepped across; but in this whole region no legitimate inference can be drawn of the size of a river, throughout its course, from that at any one point.

It may be large near its source, and after traversing deserts of sand, through arid regions, unwatered by rains, become very small, and even disappear altogether.

Therefore, except the Salinas, of which we have oral accounts, nothing is known or can be inferred of the magnitude of these tributaries from their appearance at the junction. These tributaries come in near camp 81, where the mountains are so precipitous and bold no conjecture can be formed of their course.

The Salinas must have been the branch by which the expedition of Coronado ascended and crossed into New Mexico. Its general direction is not far from a line drawn from its mouth to Santa Fé, and nearly in this line are the seven towns mentioned as being on the head waters of the San José. Indians now pass from the Pimos village to New Mexico on this route.

I omitted to mention in its proper place, that we were informed by an intelligent Marricopas Indian that, about fifty miles from the mouth of the Salinas, was now standing, in a perfect state of preservation, the walls of a large three story building of mud, with its interior sides glazed and finely polished, and about it was to be seen many traces of large acequias, and broken pottery in great abundance.

There is another tribe of Indians called the Moquis, who, like the Pimos and Soones, cultivate the soil and live in peace with their neighbors; but the exact locality of this tribe I do not know, beyond the fact that it is on or near the head waters of some of the tributaries of the Gila.

I am, with great respect, your obedient servant,

W. H. EMORY.

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APPENDIX No. 2.

College of Physicians and Surgeons,
New York, February 10, 1848.

My Dear Sir: I have examined the interesting collection of plants which you kindly placed at my disposal, and herewith send you a list of them, as complete as my numerous engagements permit me to make at present. The route which you passed over is exceedingly rich in botanical treasures, as is evident from the number of new species and genera which you were enabled to make under great disadvantages, and in an expedition which was almost wholly military in its character. Most of the new plants which you found are only indicated, or, at most, very briefly described in the following list. A more full account of them will be given hereafter.

I am, my dear sir, very respectfully, yours,

JOHN TORREY.

To Lieutenant Colonel W. H. Emory.

July 22, 1847.

My Dear Sir: I give you the following written sketch of the route, not being able, as you request, to get a trace made from my map.

From the 27th June to July 11th, we were traversing the country between Fort Leavenworth and the bend of the Arkansas, a rich rolling prairie embraced between the 39th and 38th parallels of latitude, and the 94th and 98th meridians of longitude.

From July 11th to July 13th, followed the Arkansas to Pawnee fork, in longitude about 99. At this point the fertile soil ceases, except on the immediate margin of the streams.

From the 14th July to August 1st, we were in the valley of the Arkansas, occasionally crossing the spurs of low hills which interrupt the direct course of the Arkansas. This part lies in latitude 38°, and between longitude 99° and 103° 1′.

From the 1st August to the 8th, crossing the plain in a southerly direction and mounting the Raton mountain, about 7,000 feet above the sea, between latitudes 38 and 36.

From the 8th August to the 14th, in the valleys of the tributaries to the Canadian, and crossing the extensive plains between these valleys.

From the 14th August to the 18th, ascending the great ridge between the head of the Canadian and the waters of the Del Norte, halting at Santa Fé, in latitude 35° 41′, on a tributary of the Del Norte, about 15 miles distant from the Del Norte, and about 1,500 feet above that river and 6,850 above the sea.

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From August 18th up to the 14th October, all the collections were made in New Mexico, in the valley of the Del Norte, or on the table lands adjacent, and between Santa Fé and the 33d parallel of latitude, (230 miles below Santa Fé.)

From the 14th October to the 19th, we were crossing the great dividing ridge between the waters of the Del Norte and the waters of the Gila, nearly on the 33d parallel of north latitude, and between the 107th and 109th meridians of longitude, measured from Greenwich. The greatest height of this dividing ridge along our trail was about 6,000 feet above the sea.

From the 19th of October to the 22d November, we were following the course of the Gila river, occasionally forced into the mountains to avoid the cañons. This route is never far from the 33d parallel of latitude, and is embraced between the 109° and 114° 30′ meridians of longitude, falling, during that distance, very uniformly from about 5,000 feet to near the level of the sea.

From the 22d November to the 24th, we were on the Colorado of the west, traversing a low sandy bottom.

From the 24th November to the 28th, we were crossing the great desert of drifting sand in a course little north of west.

On the 28th November, we encamped at the Cariso (Reed) creek, or spring, the waters of which, when first exposed, are warm, and emit the smell of a sulphuretted hydrogen.

From the 28th November, we commenced to ascend the Cordilleras of California, (the continuation of which forms the peninsula of Lower California, and reached the highest point of the route December 5th, 3,000 feet above the sea, and as many below the overhanging peaks. From that point we descended to San Diego, a seaport on the level of the sea, in latitude 32° 45′ and longitude 170° 11′ west of Greenwich. This point we reached December 12.

With great respect, very truly yours,

W. H. EMORY.

Professor Torrey, *Princeton*.

RANUNCULACEÆ.

Ranunculus aquatilis, *Linn*. Plains of the Arkansas.

Clematis Virginiana, *Linn*. Raton mountain. An undetermined species of this genus was found in fruit, November 10th, on the Gila. The plumose tails of the carpels are nearly three inches long.

BERBERIDACEÆ.

Berberis pinnata, *Lagasca*. Higlands bordering the Gila. This appears to be a common species in the southern part of Upper California, and in Northern Mexico.

CRUCIFERÆ.

Lepidium ruderale, *Linn*. Valley of the Arkansas.

Erysimum Arkansanum, *Nutt*. Tributaries of the Canadian.

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CAPPARIDACEÆ.

Polanisia graveolens, *Raf.* In flower and fruit, September 26—October 3, valley of the Del Norte. The plant is taller, and the flowers are considerably larger than in the form that is common in the northern United States.

Cleome integrifolia, *Nutt.* This beautiful species is abundant on both sides of the mountains, from the plains of Oregon, and the upper waters of the Platte, to latitude 33° north.

VIOLACEÆ.

Viola cucullata, *Linn.* Pawnee fork of the Arkansas.

PORTULACACEÆ.

Portulaca oleracea, *Linn.* On the Arkansas. Perhaps introduced.

Sesuvium portulacastrum, *Linn.* In flower and fruit, November 17. Saline soils along the Gila. Leaves spatulate. Flowers nearly sessile, stamens numerous. Styles 3.

GERANIACEÆ.

Geranium Frémontii, *Torr. in Frém. 2d Rep.* On the Raton.

ZYGOPHYLLACEÆ.

Kallstrœmia maxima, *Torr. and Gr.* Tribulus maximus, *Linn.* Tributaries of the Canadian.

Larrea Mexicana, *Moricand, pl. nov. t.* 48. "*Creosote plant.*" *Iodeodondo* of the New Mexicans. Used externally for rheumatism. A shrub from three to six feet high. Abundant from the upper waters of the Arkansas and valley of the Del Norte, to the great sandy deserts of California. It likewise occurs in the northern parts of Mexico. The plant abounds in a strong smelling resinous matter. No animal seems to feed on it, and it is useless for fuel, as it can scarcely be made to burn.

ANACARDIACEÆ.

Rhus glabra, *Linn.* From the upper part of the Arkansas to longitude 107°.

R. laurina,, *Nutt.* A large shrub. Mountains of California, towards the sea coast.

R. trilobata, *Nutt.* On the Gila. A shrub 18 inches high, found late in the autumn, with staminate aments nearly matured for the following spring. The whole plant is clothed with a dense velvety pubescence. It is, perhaps, a distinct species from *R. trilobata.*

MALVACEÆ.

Malva Munroana, *Dougl.* High sandy plains, and in the valley of the Gila. Flowers bright rose color.

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M. pedata, *Torr. and Gr.* Upper part of the Arkansas.

Sphæralcea stellata, *Torr. and Gr.* Near Santa Fé, &c. Highlands between the Del Norte and the Gila.

Sida coccinea, *DC.* On the Raton mountain. Several other undetermined Malvaceæ occurs in the collection.

SAPINDACEÆ.

Sapindus marginatus, (*soap berry.*) Valley of the Gila.

RHAMNACEÆ.

Ceanothus ovalis, ., *Torr. and Gr.* On the Arkansas. A small scrubby species of this genus was found on the Cordilleras of California, towards San Diego. It has thorny branches, small ovate coriaceous, smooth entire leaves, which are supported on short petioles. The branches are glabrous and glaucous. There were neither flowers nor fruit on the specimen.

C. ovalis, *var.* intermedius, *Torr. and Gr.* On the Arkansas.

LEGUMINOSÆ.

Sesbania macrocarpa, *Muhl.* On the Gila. In fruit November 20.

Glycyrrhiza lepidota, *Nutt.* Near Santa Fé. Not found in flower.

Psoralea esculenta, *Pursh.* (Pomme de Prairie.) On the Arkansas.

P. floribunda, *Nutt.* With the preceding.

Amorpha fruticosa, *Linn.* On the Gila. The specimens were without flower and fruit, and we therefore cannot be certain of the species.

Dalea formosa, *Torr. in Ann. lyc. N. York*, 2 p. 178. This beautiful species was first detected by Dr. James, in Long's first expedition. It is a shrub about three feet high, with numerous crooked branches, and purplish flowers. Near Santa Fé, and valley of the Del Norte.

D. alopecuroides, *Willd.* With the preceding.

D. laxiflora, *Pursh.* Valley of the Arkansas.

Besides these Daleæ, there were two other species, both shrubby, in the collection; but I have not ascertained whether they may not be already described. One of them is densely branched; the leaflets are in six to seven pairs, broadly obovate connate about 3 lines long, glabrous above, very villous, and furnished with large dark colored glands toward the margin underneath; they are obscurely toothed. The flowers are in short dense spikes; calyx with plumose subulate-setaceous teeth, which are as long as the tube. This species was found on the Gila river. It is very near D, ramosissima, Benth. in Bot. Sulph., p. 11., t. 10.

The other species is canescently tomentose, and diffusely branched. The leaflets are narrowly oblong, in three to four pairs, which are distant. On both sides they are sparingly furnished with small red

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glands, which are nearly concealed in the down. The flowers are in short loose, spikes, small, purple. Calyx-teeth subulate, shorter than the tube, plumose. Found on the great desert west of the Colorado.

Petalostemon gracile, β. oligophyllum. Stem erect; leaflets in 2—3, linear, slightly dotted underneath; calyx glabrous, longer than the subulate bracts, the teeth very short, ovate; petals oblong. Valley of the Del Norte.

Prosopis glandulosa, *Torr. in Ann, Lyc. N. York*, 2. *p*. 192, *t*. 2. (mezquite.) Abundant in the valleys of all the rivers, from Santa Fé, west. The trunk of this tree is sometimes 14 inches in diameter. The pods are long, flat, and filled with a sweetish pulp. They are excellent food for horses, and are sometimes used by men in times of scarcity.

P. (Strombocarpa) Emoryi, *n. sp*. Branches glabrous; spines in pairs, slender, short, straight, pinnæ a single pair; leaflets about 4 pairs, oblong, somewhat coriaceous; the under surface, and the petioles somewhat pubescent; legume spirally twisted into a compact cylinder. Found in fruit only; on the Gila river. This species is nearly allied to the P. odorata of Frémont's 2d report, but differs in its shorter, broader, and less numerous leaflets.

Schrankia uncinata, *Willd*. On the Arkansas, where it is called *sensitive vine*.

Darlingtonia brachyloba, *DC*. With the preceding.

Several other Mimoseæ are in the collection, but the specimens are mostly without leaves and flowers.

Cassia chamæcrista, *Linn*. On the Arkansas.

ROSACEÆ.

Cerasus ilicifolius, *Nutt*. Mountains of California. The kernel of the fruit has a strong flavor of bitter almonds.

Geum Virginianum, *Linn*. On the Arkansas.

Fallugia paradoxa, *Endl. gen*. 6385, *Sieversia paradoxa, Don in Linn., trans*. 14, *p*. 576, *t*. 22. A remarkable rosaceous shrub, with white flowers, and very long slender plumose tails to the carpels. It differs, in some respects, from Endlicher's character of the genus, but I have not had an opportunity of comparing it with Don's description and figure. It was found in various parts of the valley of the Del Norte. Can it be *Geum dryadoides, DC.?*

Cercocarpus parvifolius, *Nutt, Torr, and Gr., fl*. 2, *p*. 427. A shrub about 12 feet high, with numerous straight branches springing from near the ground. The carpels, with their long plumose spirally contorted *awns*, bore into the earth, after they have fallen. The action of the wind communicates to them a twisting motion, and retrorse pubescence retains them in the soil.

Spiraea Californica, *n. sp*. Shrubby; leaves ovate, lanceolate, undivided, nearly glabrous, glandularly serrate, conspicuously petiolate; flowers in compound corymbs, perfect, calyx-segments broad, about as long as the tube; disk coherent with the tube of the calyx; stamens numerous; carpels 5, distinct, 2-valved; seeds

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2, ascending, the testa expanded at the superior extremity into a membranaceous wing. Grows on high mountains near the Gila. This species is remarkable for its ascending winged seeds and coriaceous leaves. It can scarcely be referred to any of the sections into which the genus Spiraea is at present divided.

Andenostoma fasciculata, *Hook and Arn.* Abundant in the Cordilleras of California. A shrub about five feet high.

A. sparsifolia, *n. sp.* Leaves scattered, linear-subulate, dotted with glands. Cordilleras of California. A tree 30 feet high, with very numerous slender branches. Leaves nearly half an inch long, scarcely half a line wide, somewhat triangular, apparently evergreen. Flowers in small terminal paniculate spikes. Pedicels short, with numerous minute scarious bracts at the base. Calyx turbinate-campanulate, 10-striate, 5-toothed; the teeth ovate, obtuse, conspicuously imbricated. Stamens about 10; the filaments inserted into a crenulate glandular ring at the summit of the calyx-tube. Ovary obovate, compressed, with 2 collateral suspended ovules. Very different in appearance from *A. fasciculata*, and destitute of the fleshy glands, with which the throat of the calyx-tube is furnished in that species.

Photinia arbutifolia, *Linn.* Cordilleras of California. A shrub 4 5 feet high.

LYTHRACEÆ.

Lythrum alatum, *Pursh.* On the Arkansas.

ONAGRACEÆ.

Zauschneria Californica, *Presl.* Valley of the Gila. A shrub with bright crimson flowers, resembling those of a Fuchsia.

Œnothera albicaulis, *Nutt.* Valley of the Del Norte.

Œ. pinnatifida, *Nutt.* Tributaries of the Canadian river.

Œ. biennis, *Linn.* Valley of the Del Norte.

Several other undetermined species of Œnothera exist in the collection.

Gaura coccinea, *Nutt.* Tributaries of the Canadian.

G. parviflora, *Dougl.* Valley of the Del Norte.

LOASACEÆ.

Mentzelia pumila, *Nutt.* Stem whitish, slender, branching, and a little roughened above, smoothish and somewhat shining below; leaves pinnatifid, or sinuate-toothed; flowers (small) 2-3 together, pedicellate; petals 10, lanceolate; stamens very numerous; the outer filaments dilated; capsule turbinate-cylindrical; seeds numerous, winged. Valley of the Del Norte. Plant about a foot high. Flowers less than an inch in diameter. Capsule three-fourths of an inch long, 3-valved at the summit.

Cevallia sinuata, *Lagasca.* This interesting plant, which has been admirably illustrated by Fenzl, occurs in many parts of the valley of the Del Norte, from Santa Fé to Saltillo.

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CUCURBITACEÆ.

Cucumis perennis, *James, Torr. and Gr.* On the Gila river, abundant. We are yet uncertain of the genus of this plant, which seems to be common in various parts of Mexico, particularly in arid, sandy wastes. No specimens of the fruit have yet been sent to us. There are three other undetermined Cucurbitaceæ in the collection, distinct from any described in the Flora of North America.

CACTACEÆ.

Several interesting plants of this family were noticed by Colonel Emory, but they cannot be satisfactorily described from dried specimens. They are probably included among the numerous new species of Mexican Cactaceæ soon to be described by Dr. Englemann.

CORNACEÆ.

Cornus paniculata, *l'Her.* On the Arkansas.

CAPRIFOLIACEÆ.

Symphoricarpus racemosus, *Linn.* (Snow berry.) On the Arkansas.

COMPOSITAE.

Vernonia fasciculata, *Michx.* Bent's Fort.

Liatris punctata, *Hook.* Rayada Creek.

Corethrogyne tomentella, *Torr. and Gr. fl. N. Am.* 2, *p.* 99. Very abundant on the Cordilleras of the Pacific, and called by the natives *estafiat.* It is a celebrated remedy for cholera, as noticed by Colonel Emory in his report.

Dieteria incana, *Torr. and Gr.? Diplopappus incanus, Lindl.?* On the Gila. Differs from Douglas's Californian plant in its slender stem, and nearly glabrous, spinulose dentate leaves.

D. coronopifolia, *Nutt.* Valley of the Del Norte, and the head waters of the Canadian.

D. asteroides, *n. sp.* Minutely scabrous, pubescent, stem paniculately branched above; leaves oblong-cuneate, somewhat rigid, sharply and rather coarsely toothed, involucre hemispherical; scales linear, in several series, with rather short herbaceous squarrose tips; rays 30 or more, violet; achenia sparingly pubescent. Pappus of the ray much shorter than that of the disk. Elevated land between the Del Norte and the waters of the Gila. A well marked species, with leaves broader than in any other plant of the genus.

Aster hebecladus, *DC.* Valley of the Del Norte, and desert between the Colorado and Cordilleras of California.

A. (Tripolium.) A branching species, with the stems pubescent

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above, and middle sized flowers with purple rays. It seems to be undescribed. Valley of the Del Norte.

Solidago elongata, *Nutt.* Valley of the Gila.

Linosyris graveolens, *Torr. and Gr.* *Chrysocoma dracunculoides*, *Pursh.* A shrub about two feet high, and bright yellow heads of flowers. Abundant on the highlands between the Del Norte and the Gila.

Aplopappus spinulosus, *DC.* On Ocaté creek, &c., called *Pinette* by the natives.

A. Menziesii, *Torr. and Gr.* β. *dentatus:* leaves coriaceous, strongly dentate or pinnatifid, toothed, glutinous. Abundant in the great desert between the Colorado and the Cordilleras of California. Another form of this species was found near St. Diego, with the stem and the leaves clothed with a copious loose pubescence, and the serratures of the leaves few and small.

Grindelia. An apparently new species of this genus was found in ascending the Cordilleras of California, but the flowers had fallen from the heads, and our specimen is therefore scarcely sufficient for determination. The stem is very smooth and whitish; the leaves are oblong, clasping at the base, spinulose, serrate and glabrous, and the scales of the involucre are very acute, but scarcely recurved.

Chrysopsis canescens, *Torr. and Gr.* Near Ocaté creek.

C. echioides, *Benth. in Bot. Sulph. p.* 25. Valley of the Gila.

Perityle, *Benth. in Bot. Sulph.* A new species of this genus (*P. Emoryi, nob.*) was found in ascending the Cordilleras of California. It differs from P. Californica of Bentham in its smaller and much more deeply lobed leaves, narrower achenia, which are very hairy on the margins, and in other characters.

Baccharis Douglasii, *DC.* Valley of the Gila. Besides this there are three other species of Baccharis in the collection, none of which are described in the Flora of North America, but we cannot yet pronounce them new.

Tessaria borealis, *DC.* An aromatic shrub about three feet high, growing in all the deserted beds of the Gila, and in the valley of the Del Norte; usually with the Frémontia, both of which are abundant in those regions.

Hymenoclèa, *Torr. and Gr. ined.* This remarkable new genus is allied to Ambrosia and Xanthium. Another species of it (*H. Salsola*) was found in Frémont's second expedition, which, with the characters of the genus to which it belongs, will be published in another work. This species, from the scales of the involucre being in a single whorl, we propose to call *H. monogyra, Torr. and Gr.* It was found in various parts of the valley of the Gila.

Franseria Hookeriana. *Nutt.* (Yerba del Sapo.)

Ambrosia acanthocarpa, *Hooker.* Very abundant from Santa Fé to the 33d parallel of latitude.

Another species of this genus, and apparently an undescribed one, exists in the collection. It is suffrutescent hoary, with the leaves bipinnatifidly, divided into very small obtuse segments. The flowers are wanting.

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Ambrosia artemisiæfolia, *Linn.* Bank of the Gila.

Dicoris, *Torr. and Gr.* Another new genus allied to Iva, of which a full description and figure will hereafter be given. It was found in the valley of the Gila, and in the desert of drifting sands west of the Colorado. (5 to 6 inches long, and 4 to 5 wide.)

Wyethia ovata, *n. sp.*, *Torr. and Gr.*, *ined.* Stem very stout, leaves orbicular, ovate, entire; somewhat coriaceous, pubescent, (as are also the petioles and branches); scales of the involucre lanceolate; pappus of 3 to 4 acute rigid teeth, one of which is longer than the others. Abundant on the western side of the Cordilleras of California.

Silphium laciniatum, *Linn.* (Pilot weed.) On the Arkansas and its tributaries.

Another Silphium, with large ovate undivided leaves, was found on Cariso creek.

Englemannia pinnatifida, *Torr. and Gr. fl. N. Am.* 2, *p.* 283. Tributaries of the Canadian.

Lepachys columnaris, *Torr. and Gr. Rudbeckia columnaris, Pursh.* The rays vary from being wholly yellow to entirely purplish brown. From the head waters of the Canadian to Santa Fé.

Encelia farinosa, *Gray ined.* An aromatic shrubby plant; exuding a yellowish resin from the branches. The leaves are ovate, sofly pubescent, and hoary on both sides, with 3 to 5 prominent reticulated nerves underneath.

Helianthus petiolaris, *Nutt.* Upper part of the Arkansas, and valley of the Del Norte.

H. lenticularis, *Dougl.* With the preceding.

Coreopsis palmata, *Nutt.* Turkey creek.

Simsia. A rayless, and probably new species of this genus, was found in the bed of the Agua Caliente, November 28th. It is a branching shrub, and the slender bark of the irregular twigs is covered with a whitish, very scabrous pubescence. The leaves are scarcely an inch long, ovate, entire, obtuse, with short petioles, and scabrous on both sides. Chaff of the receptacle embracing the obovate achenium, the margin of which is furnished with long silky hairs.

Wulfia.? Specimens of a plant with the floral characters of this genus, but with different foliage, were found in abundance on the higher grounds bordering the valley of the Gila. It also resembles Leighia, but is destitute of a pappus. Some of the genera, to which the plant is allied, will need revision before its place can be satisfactorily determined.

Ximenesia, *n. sp.?* Valley of the Del Norte, and along the Gila, September and October. This needs comparison with some of the Mexican species. It very nearly resembles *X. encelioides, Cavan.*

Riddellia tagetina, *Nutt. Torr. and Gr. fl., N. Amer.* 2 *p.* 362. Valley of the Del Norte, about two hundred miles below Santa Fé. A beautiful plant with persistent flowers, first detected by Mr. Nuttall towards the sources of the Platte.

Baileya, *n. gen. Harv. and Gr., ined.* Two other species of this unpublished genus, dedicated to that profound observer of na-

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ture, Professor Bailey of West Point, exist among the California plants collected by Coulter, and will soon be described by Mr. Harvey and Dr. Gray. This is distinguished from the others by its numerous ray-flowers, and is the *B. multiradiata*, *Harv. and Gr.* The whole plant is clothed with a woolly pubescence, and varies from a few inches to a foot or more in height. The leaves are somewhat pinnatately cut into several narrow segments. The heads are on long naked peduncles, and when the rays are fully expanded are more than an inch and a half in diameter. The rays are 40 or 50 in number, in two or more series, obovate cuneate, of a bright orange yellow, and 7-nerved, carolla of the disk, flowers with five short segments which are glandulary pubescent, with intra-marginal nerves. Branches of the style short, somewhat dilated and truncate at the extremity. Very abundant along the Del Norte and in the dividing region between the waters of the Del Norte and those of the Gila. Flowers from October 4th to November.

Zinnia grandiflora. *Nutt. in Amer. Phil. trans.* (*n. ser.*) 7, *p.* 348; *Torr. and Gray ft. N. Amer.* 2, *p.* 298. Valley of the Del Norte. This plant, which was first detected by Dr. James in Long's first expedition, is certainly frubescent at the base; in which respect it resembles the nearly allied *Z. linearis*, *Benth. plant Hartw.*, *No.* 47. This is the most humble species of the genus; being not more than six inches high. The stem is branching and rigid. The leaves are linear, sessile, and somewhat connate at the base, strongly 3-nerved, and glandularly punctate. Heads mostly solitary at the summit of the branches, on short peduncles. Involucre ovoid-cylindrical; the scales about 8, closely imbricated; outer ones somewhat orbicular; the inner oblong, ciliate, and somewhat scarious on the margin. Ray flowers 3-5, coriaceous and persistent, roundish-ovate, emarginate, continuous with the summit of the achenium. Disk flowers few. Lobes of the corolla villous. Anthers yellows. Branches of the style tapering into a subulate-lanceolate point, hairy above the middle. Achenia obcompressed, scarcely winged, scabrous; the outer integument thin; those of the ray naked, of the disk with a single awn.

Gaillardia amblyodon, *Gay.* On the upper part of the Arkansas. This species has been beautifully figured by Dr. Gray in *Mem. Amer. acad.* (*n. ser.*) *t.* 4.

G. pulchella, *Foug.* Valley of the Del Norte.

Palafoxia linearis, *Lag.* New Mexico.

Hymenoxys odorata, *DC.* Great desert west of the Colorado.

Artemisia filifolia, *Torr. in Ann. lyc. N. York*, 2 *p.* 211. Valley of the Del Norte, and along the Gila; abundant.

A. dracunculoides, *Pursh.* Table lands of the Del Norte and Gila. A very common species of wormwood, often called *sage* by the hunters.

A. cana, *Pursh.* On the Raton Mountains.

Senecio longilobus. *Benth. in pl. Hartweg.* A bushy species about three feet high, growing abundantly in the region between the waters of the Del Norte and the Gila,

TETRADYMIA, (sub-genus Polydymia.) Heads about 16-flowered;

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canescently and densely tomentose; the leaves broadly obovate, toothed, narrowed into a petiole. Heads on short peduncles, terminating the somewhat corymbose branches.

T. (Polydymia) ramosissima, *n. sp.* Hills bordering the Gila. Stem spreading, with very numerous matted branches. Leaves about three-fourths of an inch in length, the lamina broader than long, with 5-7 indistinct rounded teeth, abruptly narrowed into a longish petiole. Heads about one-third of an inch in diameter, ovate. Involucral scales in several series, the exterior ones shorter than the interior. Hairs of the achenium smooth, slightly bifid at the summit. Pappus longer than the achenium. This plant is clearly allied to Tetradymia, but differs in the many flowered heads; numerous scales of the involucre; slightly cleft corolla tube, and in several other characters, so that it should perhaps form the type of a distinct genus.

Cirsium undulatum, *Spreng.* The locality of this plant is not recorded, but it was probably found on the upper part of the Arkansas.

Stephanomeria paniculata, *Nutt.* Ascending the Cordilleras of California.

Mulgedium pulchellum, *Nutt.* Pawnee Fork of the Arkansas.

ERICACEÆ.

Arctostaphylos pungens, *Kunth.?* Valley of the Gila and San Diego. Flowers in January.

A. tomentosa, *Dougl.?* A shrub 4 to 5 feet high. Cordilleras of California. This may be a smooth variety of Douglass plant. The leaves are orbicular-ovate, obtuse or truncate at the base, glabrous on both sides, with the petiole one-third the length of the lamina. It was not found in flower.

PLANTAGINACEÆ.

Plantago, *n. sp.?* Allied to *P. gnaphaloides*, *Nutt.* Great desert west of the Colorado, near the Cordilleras of California. The whole plant is clothed with a loose white tomentum, which is partly deciduous with age. The leaves are linear lanceolate, entire, and taper to a long narrow base. The peduncles are 5 to 6 inches long, and bear a close cylindrical spike, which is less than an inch in length. Sepals ovate, membranaceous, marked with a strong mid-rib, which is villous externally. Segments of the corolla ovate. Capsule 2 seeded.

PEDALIACEÆ.

Martynia proboscidea, *Linn.?* Abundant in the valley of the Del Norte. We have only the leaves and a drawing of the fruit. It is possibly *M. altheæfolia. Benth. in bot. Sulph.*

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SCROPHULARIACEÆ.

Maurandia antirrhina, *Lindl.* On the San Francisco, a tributary of the Gila. A slender trailing plant, with beautiful purplish flowers.

Castilleja linearifolia, *Benth.* Valley of the Gila, and the region between that river and the waters of the Gila.

Penstemon Torreyi, *Benth.* Region between the Del Norte and the Gila.

Three or four other species of Pentstemon exist in the collection, but the specimens are incomplete, and have not yet been studied.

VERBENACEÆ.

Verbena bipinnatifida, *Nutt.* Valley of the Del Norte.

Lippia cuneifolia, *Steud.* Verbena cuneifolia, *Torr.* In Long's Rocky Mountain plants. Upper part of the Arkansas, and along the tributaries of the Canadian.

LABIATÆ.

Salvia carduacea, *Benth.* Western slope of the Cordilleras of California.

Another species of this genus was found with the preceding, but not in flower, It is entirely clothed with dense soft canescent pubescence. It is shrubby, with long stout branches springing from near the root. The leaves are oblong, coriaceous, entire, and two inches or more in length.

Several other undetermined labiatæ were found in the valley of the Del Norte and on the Gila.

BORAGINACEÆ.

Myosotis glomerata, *Nutt.* Tributaries of the Canadian.

Euploca grandiflora, *n. sp.* Hirsute, with rough appressed hairs. Leaves oblong-lanceolate, on short petioles. Flowers in leafy clusters. Calyx five-paired to the base, with linear lanceolate segments. Corolla white; (the expanded limb nearly three-fourths of an inch in diameter, obscurely 5-lobed, plaited; tube slender, somewhat ventricose below the middle; the throat naked. Stamens inserted toward the base of the corolla tube; the filaments short; anthers oblong-linear. Ovary 4-celled, style filiform, persistent, arising from the summit of the ovary; stigma capitate, with a tuft of stiff hairs at the extremity. Fruit 4-celled, 2-lobed, finally separating into indehiscent carpels; embryo curved, terete, surrounded with very thin albumen; radicle superior. On the Del Norte below Santa Fé. This plant is clearly a congener of *euploca convolvulacea* of Nuttall. It is nearly related to Tourneforbia.

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HYDROLEACEÆ.

Eriodictyon, *Benth. in bot Sulph., p.* 35. *Chois in DC, prod.* 10, *p.* 183. A well characterized Californian genus, containing three described species, one of which is the *Wigandia Californica, Hook and Arn*, which was found in rocky places near the mouth of San Carlos, on the Gila, and on the Cordilleras of California. The leaves are coriaceous, varying in form from narrowly linear to lanceolate, and from being perfectly entire to strongly dentate. The upper surface (as well as the branches,) is covered with a copious adhesive varnish, while the under-side is whitish tomentose, with strongly marked reticulated veins.

POLEMONIACEÆ.

Phlox, *n. sp.* This likewise occurs in Texas, and will be described by Dr. Gray. It was found in various places on the tributaries of the Canadian.

Gilia pulchella, *Dougl.* Ocaté creek, and other tributaries of the Canadian.

G. longifolia, *Benth.* Ipomœa longifolia, *Torr.* In Long's Rocky mountain plants. Valley of the Del Norte.

Fouquieria spinosa. (*Bronnia spinosa, Kunth. nov. gen.* 6, *p.* 84, *t.* 528.) *Benth. in bot. Sulph. p.* 16. Ascending the Cordilleras of California. A highly ornamental shrub, shooting up long smooth simple stems, to the height of from 12 to 25 feet, with a panicle of scarlet flowers at the summit. It differs slightly from the figure and description of Kunth, but seems to be the same plant. The leaves are obovate-oblong, glabrous and membranaceous, grow-in fascicles in the axils of the spines. The spines are from a half an inch to near an inch in length, slender, more or less spreading, or even somewhat recurved. At the base of each is a longitudinal protuberance which extends along the stem until it reaches the spine, which is on a line with it below. The panicle is usually contracted and elongated, but sometimes short, and almost corymbose. The flowers are on short pedicels which are furnished with deciduous bracts. Sepals 5, nearly orbicular, concave, strongly imbricated, persistent, about one fourth the length of the corolla. Corolla about three-fourths of an inch long; the tube cylindrical, and often curved; limb 5-cleft, with ovate rather acute segments. Stamens 13 to 16 exserted, hypogynous; the filaments thickened and somewhat coherent at the base; anthers linear oblong, mucronate. Ovary 3-celled, with about 6 ascending anatropous ovules in each cell, style 3, parted below the middle. Capsule oblong, acute, obtuse, triangular, coriaceous and glabrous, 3-valved, loculicidal, straight, or little curved, one-celled by the separation of the valves from the triangular axis. Seeds 3 to 6, white, ovate, pellate, much compressed, with a broad winged margin, which is an expansion of the testa, and which finally is resolved into numerous fine hairs. These are beautiful objects under the microscope. They are spiral vessels consisting of an extremely delicate sheath, containing the

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loosely coiled thread which frequently ramifies with anastomosing branches. The whole testa is formed of these singular vessels. Embryo nearly as large as the seed; cotyledons foliaceous; radicle pointing downward. There can be little doubt of the propriety of uniting Bronnia and Fouquieria. Each genus was founded on a single species, and both plants seem to be very little known to European botanists. Of the former the flowers are imperfectly described, and of the latter, the fruit is unknown. Our plant partakes of the characters of both genera. In the ovary the placentæ meet in the axis, but only slightly cohere; finally they unite, but in fruit the valves of the capsule separate from the axis, to which the seeds remain attached. As to the affinities of Fouquieria, I am inclined to adopt the opinion of Lindley, that it is very near Polemoniaceæ, and particularly to Cantua. It differs, however, in its distinct imbricated sepals, (which are exactly those of convolvulus,) more numerous and hypogynous stamens; and very sparing albumen, as well as in habit. It is certainly very unlike Frankeniaceæ, to which it is appended by Endlicher. Kunth placed it among genera allied to Portulacaceæ.

CONVOLVULACEÆ.

Ipomœa leptophylla, *Torr. in Frém. 1st report, p.* 94. Upper part of the Arkansas and head waters of the Canadian. The stems are often erect, about two feet high, and of a bushy appearance. From the appearance of the specimens, I should suppose the plant were a perennial, but according to Dr. James it is an annual.

One or two other Convolvulaceæ were in the collection, but I have not determined them to my satisfaction.

SOLANACEÆ.

Nycterium lobatum. Between Fort Leavenworth and the head of the Arkansas.

Datura metel, *Willd.?* Valley of the Gila. It grows from four to five feet high, with spreading branches. Perhaps introduced.

Solanum triflorum, *Nutt.* Upper part of the Arkansas, and on the tributaries of the Arkansas.

Another species of Solanum was found on the Del Norte below Santa Fé. The whole plant is clothed with a dense yellowish white pubescence. The stems are rough, with minute slender prickles. Leaves linear-oblong, entire, rather obtuse, prickly along the midrib. Flowers, two or three together at the summit of the branches, white.? stamens 5; anthers equal.

GENTIANACEÆ.

Eustoma Russelianum, *Don.* Near the bank of the San Pedro. A showy plant.

Erythræa Beyrichii, *Torr. and Gr. E. tricantha B. Griseb.* Valley of the Del Norte, and along the Gila.

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OLEACEÆ.

Fraxinus velutina, *n. sp.* Branches, petioles, and under surface of the leaves, clothed with a dense soft pubescence. Leaflets 3 to 5, rhombic ovate, cuneate at the base, coarsely serrate or toothed, sparingly pubescent above. Fruit narrowly oblanceolate, nearly entire at the apex, about three-fourths of an inch long. A small tree, usually from 15 to 20 feet high. Grows in the region between the waters of the Del Norte and the Gila; also on the Mimbres, a tributary of the latter river.

NYCTAGINACEÆ.

Abronia mellifera, *Hook.* Valley of the Del Norte.

A. (*Tripterocalyx*) micranthum, *Torr. in Frém. 1st report, p.* 96. Valley of the Del Norte.

This differs in some respects from Frémont's plant. The peduncles are elongated, and the fruit is more than an inch long, with very broad wings. The structure of the seed is precisely the same as in that plant, the inner cotyledon of the conduplicate embryo being abortive. It is wanting also in A. mellifera. In several species of this genus, if not in all of them, the filaments adhere throughout nearly their whole length to the tube of the perianth. The lobes of the perianth are dilated, and deeply emarginate, but appear ovate in the bud, from the lobules being conduplicate.

CHENOPODIACEÆ.

Sarcobatus vermiculatus, *S. Maximilioni, Nees in Prince Maxim. trav., Engl. ed., p.* 518. *Frémontia vermicularis, Torr. in Frém. 1st report, p.* 95; *and 2d report, p.* 317. *Batis vermicularis, Hook, fl. Bor. Am.* 2, *p.* 188. Abundant on the Del Norte, and upper part of the valley of the Gila.

This is the *pulpy thorn* of Lewis and Clark. It has a very extensive range in the desert regions on both sides of the monntains. Since my notices of this plant were published in Frémont's reports, I have ascertained that Nees' description of his genus, Sarcobatus, dates a little anterior to mine, so that his name must be adopted.

Obione argentea, *Moq. Atriplex argentea, Nutt.* Abundant in sandy saline places on the Del Norte.

O. polycarpa, *n. sp.* Valley of the Gila.

Eurotia lanata, *Moq.* Valley of the Del Norte. A shrubby Salicornia, an Atriplex, and a species of Sueda, were found in saline soils along the Gila.

AMARANTHACEÆ.

Amaranthus hybridus, *Var.?* Glabr. Stem and leaves nearly smooth, flowers (purplish) crowded in a dense compound terminal spike; bracts somewhat awned, shorter than the flowers; utricle opening transversely. On the Del Norte, below Santa Fé.

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POLYGONACEÆ.

Eriogonum trichopes, *n. sp.* Stem scape-like, verticillately and divaricately much-branched, glabrous; peduncles capillary; involucre minute, few flowered, glabrous, 4-toothed; the teeth nearly equal, obtuse, erect; sepals ovate, acute, nearly equal, very hairy. Eastern slope of the Cordilleras of California. Our specimens of this remarkable species are imperfect, the leaves being wanting. They probably grow in a radical cluster. The flowering stems are a foot or more high, with the primary and secondary branches verticillate; the branchlets are bi-trichotomous, and the ultimate divisions or peduncles somewhat secund. Involucre scarcely half a line in length, 5—6 flowered, and only 4-toothed. The flowers are nearly twice as large as the involucres, sepals concave, erect spreading. Stamens scarcely exserted.

E. tomentosum, *Michx.* Abundant in the region between the valley of the Del Norte and the waters of the Gila; the most western station hitherto found of this species, which is almost the only eriogonum known east of the Mississippi.

E. Aberteanum, *n. sp.* Annual? Canescently tomentose; stem dichotomous above; leaves oblong-lanceolate, attenuated to a petiole at the base; involucres solitary, somewhat racemose on the branches, pedunculate, many flowered, campanulate, deeply 5—8=parted; exterior sepals nearly orbicular, deeply cordate at the base; inner sepals narrow, carinate below, contracted above, somewhat dilated and emarginate at the summit; stamens much shorter than the sepals. Very common in the region between the Del Norte and the Gila. Also found by Lieutenant Abert on the upper waters of the Arkansas. Just as I was sending these notes to the press, I received a visit from Mr. Nuttall, who informed me that a species allied to this was found by Mr. Gambel, in his late journey to California. He thinks its characters differ so much from all the eriogona hitherto described, that he has constituted of it a new genus under the name of Eucycla. A full account of Mr. Gambel's plants, by Mr. Nuttall, will soon be published in the journal of the academy of Philadelphia. Our plant is about a foot high, with loosely paniculate branches.

The heads and flowers are nearly as large as those of *E. tomentosum.* The sepals are yellowish, tinged with rose, the three inner ones differ widely from the others; they are carinate and glandular on the back below the middle, and closely embrace the pistil, the angles of which correspond with the keels of the sepals.

Imperfect specimens of several other eriogona occur in the collection.

SAURURACEÆ.

Anemopsis Californica, *Nutt. Hook. in bot. Beechey's voy., p.* 390, *t.* 92. Valley of the Gila.

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EUPHORBIACEÆ.

Eremocarpus setigerus, *Benth. in bot. of Sulph.*, *p.* 53, *t.* 26. Plains of San Diego, California.

Hendecandra Texensis, *Klotzsch. H. multiflora*, *Torr. in Frém.* 1*st report. Croton muricatum*, *Nutt.* Valley of the Del Norte.

Another species of this genus, allied to *H. procumbens*, was found on the Cordilleras of Mexico, but the materials are scarcely sufficient for determining it satisfactorily.

Stillingia spinulosa, *n. sp.* Suffruticose? leaves rhombic-ovate, rigid, narrowed at the base, prominently 3-nerved, mucronately acuminate, dentate-spinulose on the margin; spikes axillary and terminal; sterile flowers sepile; bracts acuminate, with a stipitate gland on each side at the base. Abundant in the desert west of the Colorado. Stem (apparently) about a span high, with spreading branches. Leaves an inch or more in length, sessile, neatly margined, with spreading spinulose teeth, glabrous on both sides. Spikes numerous; with solitary fertile flowers at the base. Sterile flowers about as long as the scale. Perianth hemispherical, irregularly lobed and undulated. Stamens 2. Fertile flowers imperfect in our specimens. Fruit glabrous.

Euphorbia herniarioides, *Nutt.* Banks of the Gila. A pubescent variety of this species was found in the desert west of the Colorado.

CUPULIFERÆ.

Quercus Emoryi, *n. sp.* Leaves coriaceous, oblong, on very short petioles, remotely and repandly toothed, the serratures mucronate, smooth on both sides; fruit pedunculate, solitary and in pairs, gland ovoid-oblong, mucronate; cup hemispherical, the scales appressed. Common in the elevated country between the Del Norte and the Gila. This small leaved oak resembles Q. *agrifolia* and Q. *undulata*, (*Torr. in Ann. lyc. N. York* 2, *p.* 248, *t.* 4,) but is quite distinct from both.

SALICACEÆ.

Salix. Several narrow leaved willows were found along the Gila, and in the region west of the Colorado, but being without fructification they cannot be determined. One of them is used as food for cattle when there is no grass.

PLATANACEÆ.

Platanus Mexicanus, Moricand pl. *nouv. ou rars d'Amer. t.* 26. *P. Californicas*, *Benth. bot. Sulph.*, *p.* 54. *P. racemosus*, *Nutt.?* Valley of the Gila.

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CONIFERÆ.

Ephedra occidentalis, *Willd.?* From the region between the Del Norte and the Gila, and the hills bordering the latter river to the desert west of the Colorado. A shrub 3—4 feet high, with numerous slender branches; its appearance being that of Scotch broom. (Spartium scoparium.) The sheaths are very long, 3-parted, with subulate-acuminate segments. This can hardly be the *E. Americana* of Quito, which is described as having 2-parted sheaths. The specimens are without either flowers or fruit. If the species should prove to be new, it may be called E. trifurcus. There seems to be still another species growing on the table lands of New Mexico, differing from the preceding in its very short sheaths.

Juniperus. Two undetermined species were found in crossing the country from the Del Norte to the Gila. Both of them have the general character of *J. Virginiana*. One is a large tree, with acerose leaves, and a bark like that of a pinus; the other has short closely appressed leaves and berries larger than a buck shot.

AMARYLLIDACEÆ.

Agave Americana, *Linn.* Found in descending the western slope of the Cordilleras of California. This is the *maguey* of the Mexicans. It shoots up a flowering stalk 10 or 15 feet high. The juice of the plant affords an intoxicating drink called *pulque.*

Another species of agave, or a very remarkable variety of the preceding was found in New Mexico, west of the Del Norte. It differs from *A. Americana* in its much shorter and broader leaves, which are furnished with smaller marginal spines.

LILIACEÆ.

Yucca. The leaves only, of what appear to be four species of this genus, occur in the collection, but we cannot identify them for want of the inflorescence.

ORCHIDACEÆ.

Spiranthes cernua, *Rich.* Low grounds in the valley of the Del Norte.

CYPERACEÆ.

Eleocharis quadrangulata, *R. Brown.* Valley of the Gila.
Cyperus Michauxianus, *Schultes.* Valley of the Gila.

GRAMINEÆ.

Chloris alba, *Presl.* Spikes umbellate-fasciculate, numerous, (8—12,) the peduncle inclosed in a broad compressed sheath; spikelets 2-flowered; upper glume nearly as long as the flowers,

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2-toothed, with a short awn between the teeth; lower palea of the perfect flower obscurely 3-nerved, gibbous in the middle, the margin ciliate, with long hairs towards the summit; awn three times as long as the palea; neuter flower broad and truncate, inclosing a short aristiform rudiment; the awn twice as long as the palea. Bed of the Gila. Very near *C. barbata*, which differs in the entire glumes, which are only mucronate (not awned) in the entire straight lower palea of the perfect flower, and in the third or aristiform flower, being much exserted.

Boutelona racemosa, *Lagasca.?* Culm erect, simple; spikes numerous (20—40) reflexed, 3-flowered, lower glume linear-nebulate; upper one linear-lanceolate, scabrous, entire, nearly as long as the spikelets; lower palea of the perfect flower unequally tricuspidate, pubescent, abortive flower reduced to a slender awn, which is nearly as long as the perfect flower, furnished at the base, with 2 short and inconspicuous bristles. Valley of the Gila, rare. This plant agrees pretty well with Kunth's description of *B.* (*Eutriana*,) *racemosa*, except in the pubescent lower palea, and the minute bristles at the base of the neuter flower. Whether it be the plant of Lagasca or not is very difficult to determine from his brief character. It certainly is very different from *B. racemosa* of the United States, which has a large 3-awned neuter flower, and if distinct from Lagasca's, must receive another name. That of *B. curtipendula* would be appropriate.

Chondrosium eriopodum, *n. sp.* Culm simple, pubescent below; spikes 4—6, racemose appressed; spikes on short woolly peduncles, spikelets 2-flowered; flowers distichous; glumes very unequal, glabrous, linear-lanceolate, mucronate, entire; lower palea of the perfect flower glabrous, bifid at the apex, with a short bristle between the teeth; neuter flower pedicellate, with 3 slender awns. This is one of the species of "Grama" so useful as a fodder-grass in New Mexico. It is abundant along the Del Norte, and in the region between that river and the waters of the Gila. The culm is slender, a foot or more in height. Leaves are very narrow, 2—3 inches long, with glabrous sheaths; sessile almost wanting. Spikes about three-fourths of an inch long.

Chondrosium fœneum, *n. sp.* Leaves glabrous; spikes 2—3, oblong, folcate, spreading; rachis nearly half the length of the spikes; upper glume nearly as long as the perfect flower, with two rows of piliferous glands on the back; lower palea deeply 3-cleft, the segments lanceolate and mucronate, hairy on the margin; neuter flower of two truncate emarginate valves, with a 2-valved rudiment of a third flower, and 3 short stout awns. Uplands bordering the valley of the Del Norte. This is another of the grasses called *Grama* in New Mexico, and is the best kind, being almost as good fodder as oats. It is nearly allied to *Atheropogon* (*Chondrosium*,) *oligostachyum* of Nuttall.

Chondrosium polystachyum, *Benth. bot. Sulph. p.* 56. Uplands bordering the Gila. The smallest kind of "*Grama*" found on the journey. It is about 6 inches high, very slender. The spikes are narrowly linear, and almost half an inch long, erect, on short

brownish peduncles. The other characters agree minutely with Mr. Bentham's admirable detailed description in the work quoted above.

Leptochloa filiformis, *Roem and Schults*. Valley of the Gila. Scarcely distinct from *L. mucronata* of the United States.

Sesleria? dactyloides, *Nutt*. Upper part of the Arkansas. This is the celebrated "*Buffalo* grass," so called because it constitutes the chief fodder of the wild buffalo, during the season that it flourishes. I have retained this plant, for the present, where it was placed by Mr. Nuttall, who noticed its anomalous characters. It differs from sesleria, and indeed from the Torbe *Festucaceæ*, in its habit, which is that of chondrosium. The stem throws off suckers which root at the joints, from whence leaves and culms of a few inches in height are thrown up. The spikes are two or three in number, on short spreading peduncles, They are oblong, about half an inch in length, and obtuse; bearing from 6 to 8 spikelets, which are unilateral, and form a double row on the rachis. The spikelets are usually 2-flowered, but I have occasionally found them with 3 flowers, and even the rudiment of a fourth. The glumes are very unequal, oblong-ovate, coriaceo-membranaceous, carinate and one-nerved, the upper one slightly mucronate. Palea oblong-lanceolate, and somewhat keeled, membranaceous, nearly equal, but longer than the glumes, entire glabrous, except on the keel; the lower 3-nerved, the upper bi-carinate. Anthers large, linear, fulvous. In all the specimens of this collection, as well as in those in my herbarium from numerous other localities, there are no fertile flowers, and only in a few instances rudimentary styles, so that the plant seems to be diœcious or polygamous by abortion.

Arundo Phragmites, *Linn*. Valley of the Del Norte, and along the Gila.

Andropogon argentens, *DC.*, *Kunth. enum. t, p.* 500. Valley of the Gila. A handsome species, with the spikes in a terminal panicle, which has a white appearance from the abundant silky hairs of the flowers.

A. macronrus, *Michx*. With the preceding.

Besides these grasses, there were a few others, mostly collected in the valley of the Gila, but which I have not determined, as the specimens are not so complete as could be desired. Among them are a *glyceria*, two *agrostides*, five species of *pamcuin* and a *poa*, (*eragrostis*,) with large elongated spikelets. In some parts of the valley of the Del Norte, *sorghum vulgare* is cultivated, and was found partly naturalized.

EQUISETACEÆ.

Equisetum hyemale, *Linn*. Lower part of the Colorado.

FILICES.

Adiantum tenerum, *Swartz*. Valley of the Gila. This species is widely spread over the southern part of North America, and yet

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has not hitherto obtained a place in our Flora. We have it from Alabama, Florida, Texas, and various parts of California.

Lycopodium. A small species allied to *L. rupestre*, was found in descending the Gila. It differs in its incurved leaves, which are mucronate, but without a bristle at the tip. No fructification exists in the specimen.

St. Louis, *February* 13, 1848.

My Dear Sir: Your letter, together with the package containing the drawings of a number of most interesting cactaceæ, arrived safely here about two weeks ago.

On the occasion of my report on the botany of Dr. Wislizenus's voyage, I have made a careful investigation of the cactaceæ, of which he brought home with him more than 20 species, and have been enabled to elucidate several points which had been unknown, or obscure before; no doubt because in the hot-houses of European gardens, these curious plants, though they thrive pretty well, rarely produce flowers and fruit; so that from 800 species of cactaceæ at present cultivated in Europe, perhaps not one fourth is known as to its flower, and a much smaller proportion in fruit.

I am now able to distinguish all the different genera of cactaceæ by their seed, and sometimes even the different sections of one genus.

The small black shining seed sent me, belongs to a true *cereus*, probably the plant which you mention under the name of pitahaya, the larger opaque black seed is that of an *echinocactus*, and the largest white seed is the seed of an opuntia of the section *cylindraceæ*.

I have ventured to describe some of your species from the drawing; my descriptions, however, and the names given by me, must remain doubtful till we are able to obtain some more data to characterize the species. I have written it more for your information than for publication, but if you choose to append it to your published report, I have no objection to it, but must request you to make such corrections or alterations as your notes or your recollection of the plants will enable you to do; for example, as to size, as in some of the drawings no size is mentioned,* in which case I have assumed them to represent the natural size. I have, for convenience sake, numbered the different figures, and shall now proceed to copy for you the descriptions and remarks following my numbers.

1. Mammilaria, October 18, 1846.

Proliferous in the highest degree, forming hemispherical masses often of a diameter of $3\frac{1}{2}$ feet; which are composed of 100—200 different heads or stems. Single heads conical, apparently about 4 or 5 inches high, and $2\frac{1}{2}$—3 inches in diameter; color, bluish green; spines white or reddish.

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* **Where the size is not mentioned, the original drawings are the size of nature. W. H. E.**

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This species appears to be allied to *M. vivipara*, but is distinguished by the conical heads, and the hemispherical tufts, while *M. vivipara* has hemispherical or even depressed heads, and forms flat and spreading masses.

It may be an undescribed species, in which case the name of *M. aggregata* appears to be most appropriate.

2. *Mammilaria*, October 26, 1846. Rare.

Apparently a *mammilaria*, though the habit of the plant is more that of an *echinocereus*, but all *echinocerei* have the bunches of spines disposed in vertical ridges, which is not the case in the figure in question. Stems irregularly cylindrical, with divers contractions and swelling, about 4—6 inches high, and 1¼ to 1¾ inches in diameter, many (in the fig. 8) from one base.

The name of *M. fasciculata* would indicate the peculiarity of this species.

3. *Mammilaria*, "November 4th, 1846, abundant."

Several (fig. 3.) oval stems from one base, 1½—2½ inches high, and 1¼ inch in diameter; tubercles in about 13 rows; spines whitish, short; 1 small obovate red berry toward the apex not more than 1½ line long.

If the figure is correct, this species ought to be distinguished by the name of *M. microcarpa*, as I know of no other mammilaria with such a small fruit.

4. *Echinocactus Wislizeni*. (Engelm. in Wizlizenus's report.) "October 26th, 1846." In addition to the description in Dr. W.'s report, which I have drawn up from dried specimens, I observe in this figure that the species has 21 oblique ribs, is of an oval shape, and bluish green color; the ribs are acute, but not compressed, according to the representation of a section, and the groves corresponding.

5. *Echinocactus*, "October 25th, 1846, 18 inches in diameter." Height equal to the diameter; shape ventricose, contracted towards the vertex, therefore somewhat urceolate; with 21 straight sharp ribs; spines apparently 8, straight, brown, color of plant bright green; vertex whitish, (tomentose?) fruit 1 or 1½ inches long, oval, yellowish or reddish. Seed obovate, obliquely truncated at base, full 1 line long, black, opaque, slightly roughened; embryo curved or hooked, cotyledons accumbent, partly buried in the large farinaceous albumen.

This species is distinct from all other New Mexican species examined by me, and is most probably undescribed. I propose to name it after its zealous discoverer, who has, surmounting numberless difficulties, though occupied by severe and arduous duties, found leisure to do so much for the advancement of our knowledge of the wild countries traversed by him, *echinocactus Emoryi*.

6. Cereus. "November 21st, 1846, 3 feet high."

There can be but little doubt but that we have here a species before us, which I have received from Dr. Wislizenus and from Dr. Gregg, from the neighborhood of Chihuahua, and which I have described in Dr. W's report by the name of *C. Greggii*, erect, branch-

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ing, with 5 compressed ribs, dark green, with whitish areolæ, and about 8 short dusky spines.

The specimen figured here is very remarkable on account of the fruit, which was unknown to me. Provided the drawing is correct, we have here a smooth oval acuminate fruit crowned with the remains of the corolla, and supported by a distinct stipe of a bright crimson color. A stipe, as well as such an acumination, I have not seen in any other fruit of a cactus. Fruit, with the long acumination, 2½ inches long, ¾ to 1 inch in diameter, stipe about ½ inch long.

7. *Opuntia.* "Very abundant on the Del Norte and Gila." No date nor statement whether the figure represents the natural size or is smaller.

The species belongs to the section *ellipticæ* of Salm, it is ascending, older stems prostrate, branches and younger joints erect, 8—10 inches high; joints orbicular obovate, rounded, obtuse or sometimes acutish, of a bluish green color, 1½ to 2½ inches long, and little less wide; spines short and whitish; berries obovate, scarlet, only about 3 or 4 inches long. If the figure represents the natural size, this species ought to bear the name *O. microcarpa*.

8. *Opuntia.* "October 28th, 1846, common on the Gila." Much branched, sub-erect, joints obovate, often acutish, purplish, with two or three longer brown spines directed downwards; fruits obovate, red. In the figure, the joints are 1½—2 inches long, and 1—1¼ wide; fruit about 3 lines long.

There are several opuntiæ known with purple colored joints, but none in the least resembling this, and I must consider it as a distinct species to whichI would give the name of *O. violacea*.

9. *Opuntia?* "October 22d, 1846. Abundant on the Del Norte and Gila." A remarkable plant apparently more like a *mammilaria* than like an *opuntia*. The fruit is also represented without areolæ or tubercles, exactly like the smooth fruit of a *mammilaria*; but this may be an oversight in the artist. The habit of the plant suggests the belief that it is an opuntia of the section *cylindraceæ*.

Joints or branches ascending, cylindrical, tuberculated, 4—6 inches long. 1—1¼ inches in diameter; tubercles very prominent, with about 8 long (1—1½ inches) straight spines; fruits obovate, umbilicate, scarlet, towards the top of the branches, about 9 lines long, and 6 in diameter.

It is a distinct species which I am gratified to dedicate to the skilful artist who has drawn all these figures, Mr. J. M. Stanly, I therefore propose for it the name *opuntia Stanlyi*.

10. *Opuntia.* "November 3d, 1846, 4 feet high." Stem erect, with verticillate horizontal, or somewhat pendulous branches; branches cylindrical, strongly tuberculated, about 8 lines in diameter, with short spines on the tubercles; fruit pale yellow, clavate, tuberculate, umbilicate, 1 to 1½ inches long, 6—8 lines in diameter.

This is probably the *opuntia arborescens, Engelm. in Williz's report*, though the spines are represented as being shorter than in my specimens of *O. arborescens* from New Mexico and Chihuahua.

11. *Opuntia.* "November 2d, 1846. Somewhat resembling the

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last, but forming 'low wide spreading bushes.'" Joints more slender, only about 4 or 5 lines in diameter, alternating (not opposite nor verticillate,) forming with the stem an acute angle, suberect, tubercles more prominent, ærolæ whitish at their lower edge, with 3 dusky deflexed spines; fruit clavate, tuberculate, pale yellow, 1 inch long, 4 lines in diameter.

I believe this to be an undescribed species, and would propose the name for it of O. Californica.

12. *Opuntia.* "October 10th, 1846, abundant," 3 feet high, with spreading branches, the same in circumference.

I can see no difference between this figure and a plant which I have received from El Passo, by Dr. Wislizenus, and which I have described in his report under the name of *O. vaginata.*

Nos. 13—15 are no cacti. In 13 I recognise the *Kœberlinia zuccarini*, a shrub common in the chaparals of northern Mexico, which has been collected in flower about Parras and Saltillo, by Drs. Wislizenus and Gregg. The fruit is unknown so far; the specimen figured is however in fruit; the berry (?) is globose, ¾—1 line in diameter, crowned with the rudiment of the style. It was collected October 23d, 1846, and is described as a shrub 3 feet high, with low spreading boughs.

14. Collected "November 15, 1846. 4 feet high, rare," is perhaps another species of the same genus, but the entire absence of flower or fruit make it impossible to decide.

Branches similar, straight, leafless, ending in robust dark spines; but much elongated and sub-erect, not horizontal, as in No. 13.

15. "October 22d. Very abundant, 3 feet high, fruit 5 inches long." It is entirely unknown to me, perhaps an agave? at least some amaryllidaceous plant, if the fruit is correctly represented, with large radical leaves, and a ribbed or angular inferior fruit crowned with the remains of the flower.

In your letter you figure and describe a cactus plant, of which you have before sent me the seeds, if I am correct about this from your notes, I would describe it in the following manner:

Stem tall, erect, simple, or with a few erect branches, below without spines; ribs about 20, oblique or spiral; fruit large, edible; seeds small (0.7 lines long,) obovate, obliquely truncate at base, black, smooth, shining, embryo hooked, no albumen; cotyledons foliaceous incumbent.

Stems 2—5 feet in circumference, and 25 to 60 feet high.

The only true *cereus* approaching this in size is *cereus* Peruvianus; but this is vastly different. The question then arises whether our species is not one of the few arranged now under the genus *pilocereus*; but if it is a constant fact that the cotyledons of *pilocereus* are thick and globose, our species cannot belong here; the cotyledons are absolutely those of a true *cereus*. It is called in California *pitahaya*, but it appears that the Mexicans call by that name all large columnar cacti, the fruit of which is edible. The plant which is commonly called *cereus variabilis*, is widely different from this California giant.

I propose for it the name *cereus gigantens.*

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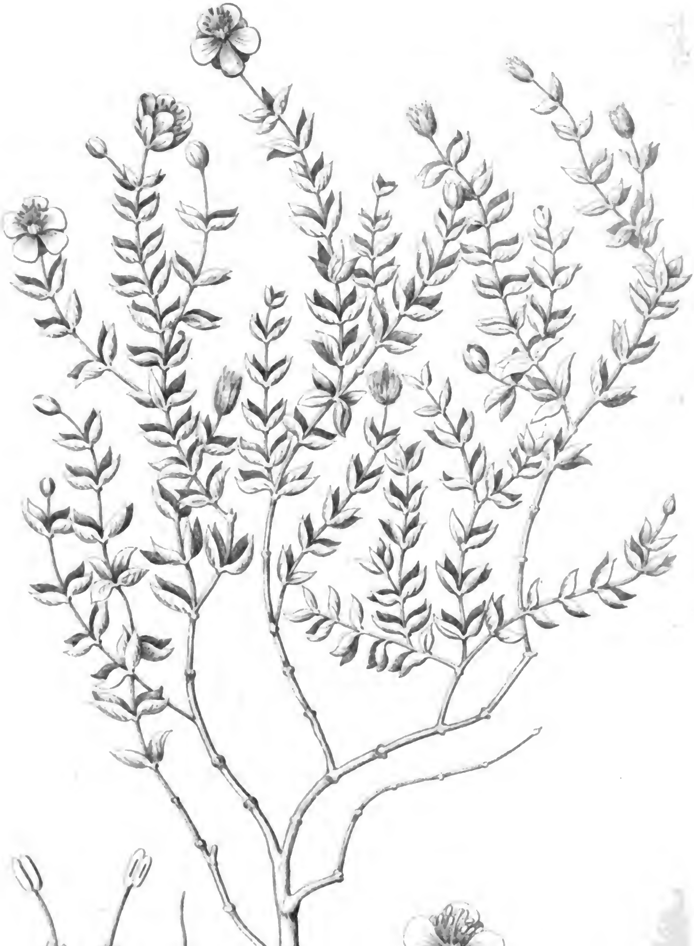
III



LARREA MEXICANA

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ZINNIA GRANDIFLORA

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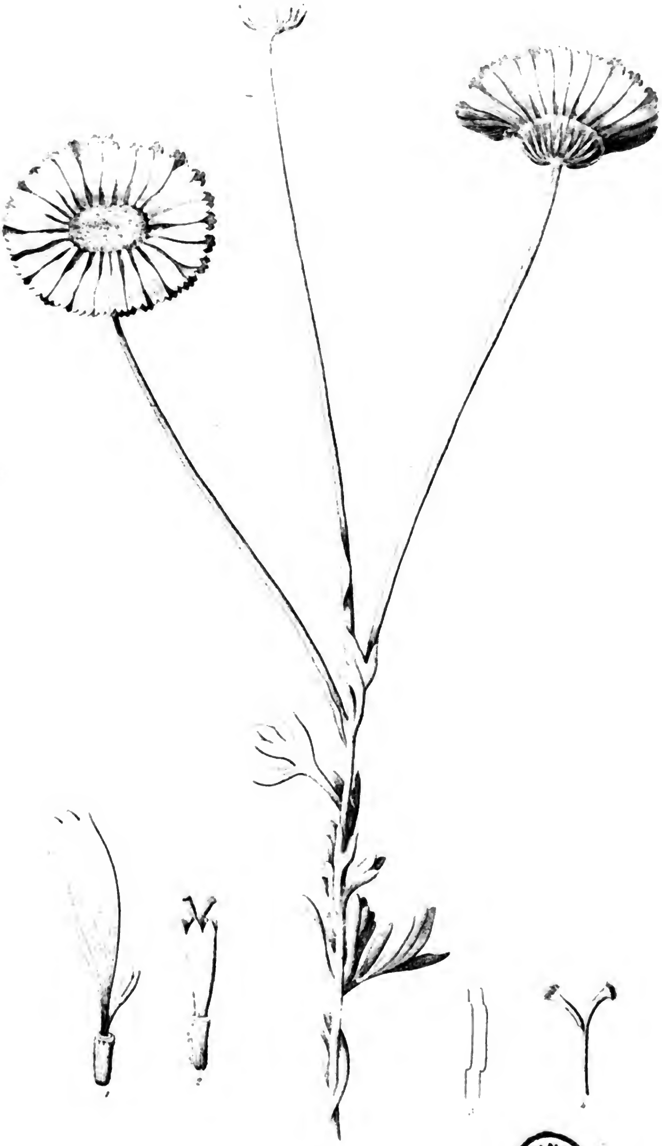

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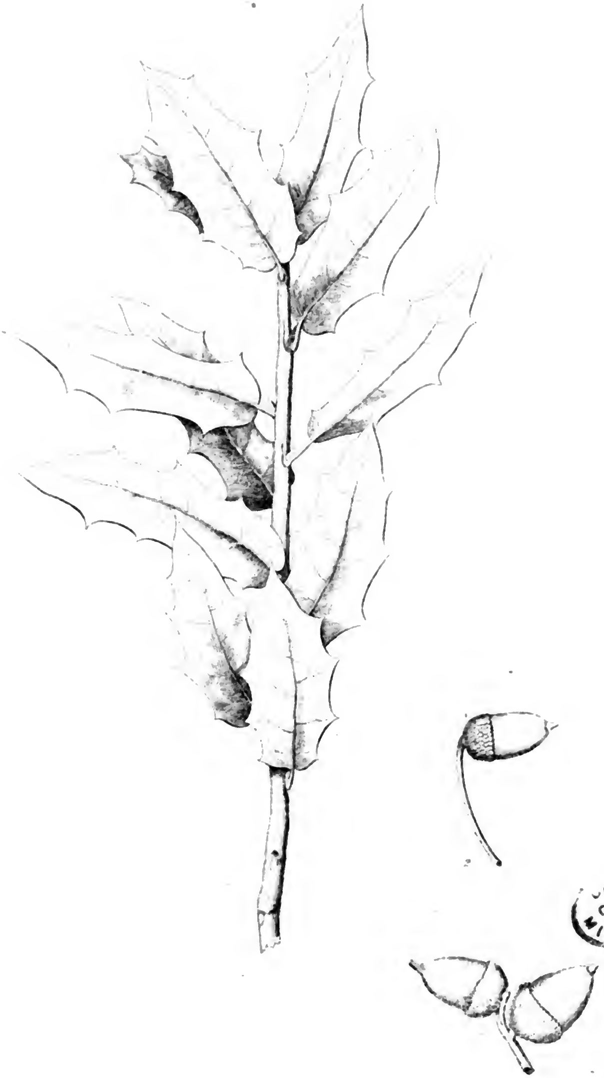
IX



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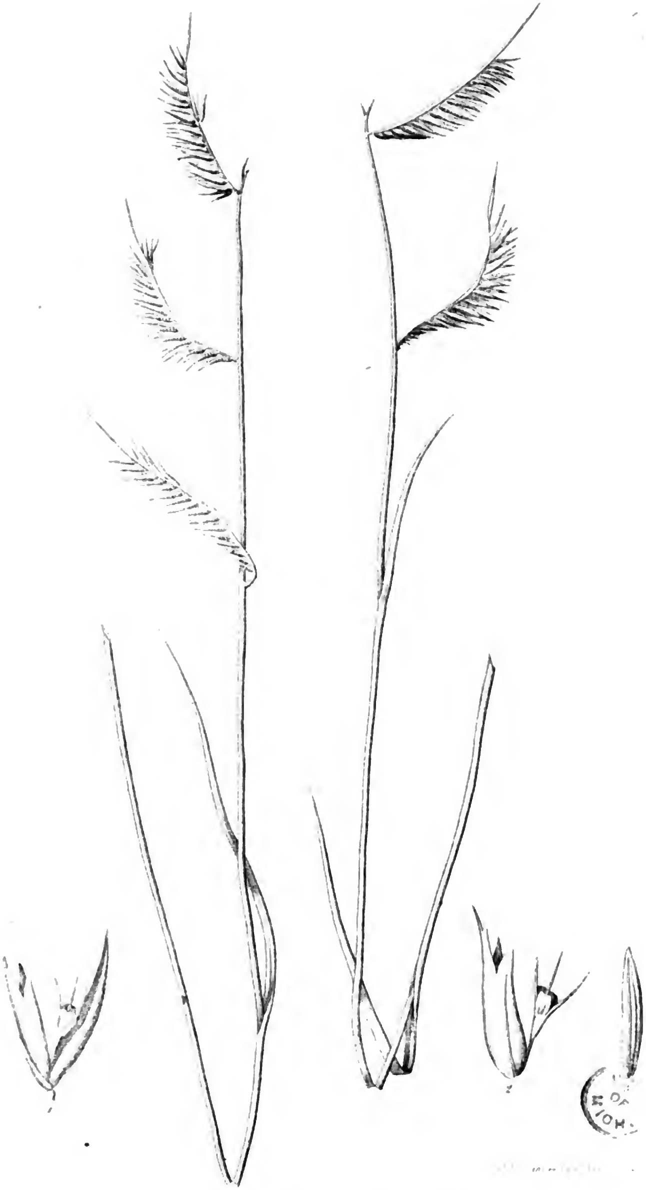

CHONDROSIUM FENEUM

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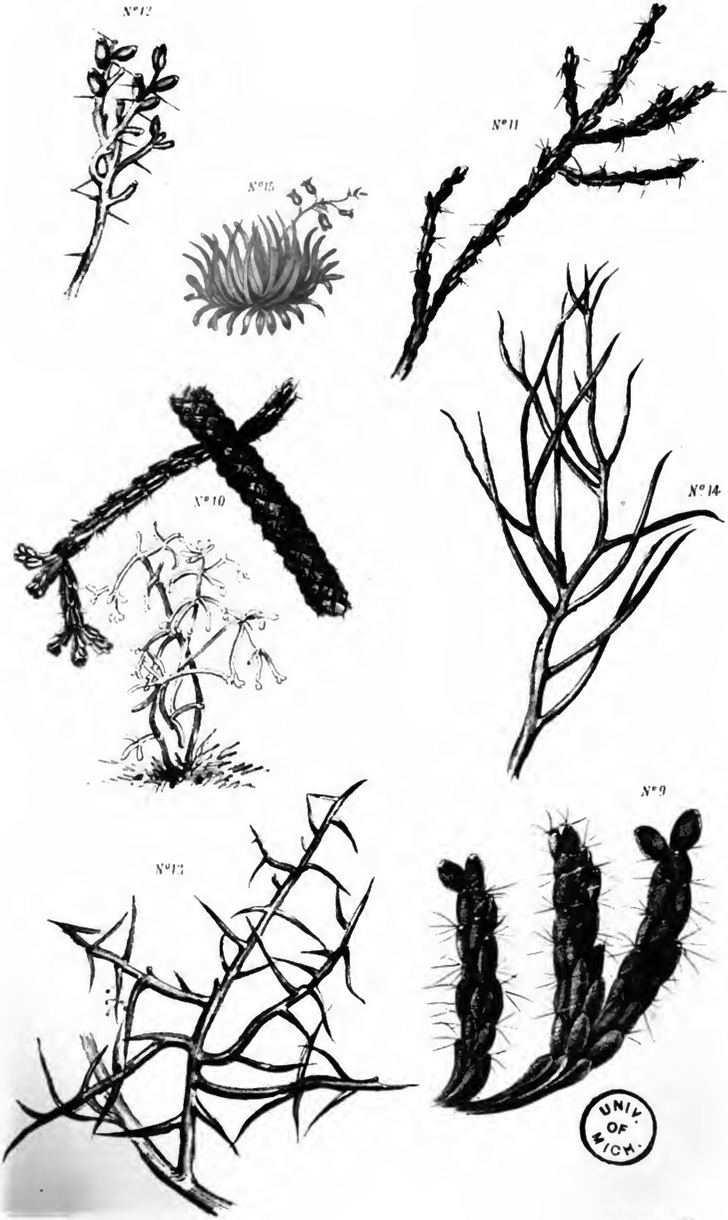
No 1
No 6
No 2
No 3
No 7
No 4
Cross section
No 8
No 5



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The large white seed is that of an *opuntia* of the section *cylendraceæ*, embryo circular, curved around a pretty large albumen, but not spiral.

Very truly, yours,

G. ENGELMANN.

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APPENDIX No. 3.

Table of meteorological observations.

Places of observation.	Date.	Time.	Barometer.	Thermometer.			Approximate altitude.	Remarks.
				Attached.	Free.	Wet bulb.		
				C.	F.	F.		
Fort Leavenworth	June 23	3 p. m.	73.75	18	62½	......	......	Raining, NE.
Do	June 24	9 a. m.	74.24	16½	73	......	......	Wind NE ; cloudy.
Do	do	12 m.	74.11	19	71½	......	......	Wind NNE.; cloudy.
Do	do	3 p. m.	74.12	19	70	......	......	Cloudy, with occasional showers.
Do	June 25	9 a m.	74.20	21.5	70	......	......	Cloudy.
Do	do	12 m.	74.04	24	74	......	......	Cloudy.
Do	do	3 p. m.	73.98	25½	77	......	......	Light clouds; wind SE.
Do	June 26	9 a. m.	73.92	22½	78	......	......	Few light clouds; wind west.
Do	do	12 m	74.16	24.5	76			
Do	do	3 p. m.	73.90	26	78	......	......	Clear wind NW.; gentle breeze.
Do	June 27	6 a. m.	73.81	21	75	......	......	Clear.
Camp 2, Strangers' creek	June 28	5 p. m.	73.64	30	84	80	1044.	
Do do	June 29	5.30 a. m.	73.68	21	70	68		
Camp 3, Kansas river	June 30	5 a. m	74.09	22	72	71.5	850.	Clear.
Camp 4, Oregon trail, on the Makurussi	June 31	6 p. m.	74.20	26	78	73.5	781.	Gentle breeze NE.; very fair.
Camp 4, Oregon trail, on the Makurussi	July 1	5.30 a. m.	74.40	20.5	71	69		Cloudy.
Camp 5, on the Santa Fé road	do	7 p. m.	73.58	27½	79	74½	1060	Very fair; clear and beautiful sunset.
Do do	July 2	5 a. m.	73.60	21	70	67		Heavy mist and dew.
Camp 6, on 110 creek	do	7 p. m.	73.28	29	82	75	1179.	Brisk wind from SW.
Do do	July 3	5 a. m.	73.28	21	72	69		Fresh breeze south.
Camp 7	do	7 p. m.	72.77	27	81	74	1363.	Strong breeze; wind SSE.
Do	July 4	4.30 a. m.	72.86	22	70	69		Clear.

Camp 8, Big John spring	July 4	7 p. m.	72.64	29	83	77	1456	Wind SE.
Do do	July 5	4.30 a. m.	72.54	23	73	70		Clear; temperature Big John spring 53° Fa.
Camp 9, Diamond spring	do	7 p. m.	72.33	24½	78	75	1511	Very fair; no wind.
Do do	July 6	4.30 a. m.	72.49	23	73	70		Cloudy: temperature of spring 54° Fa.
Camp 10, Cottonwood stream	do	7 p. m.	72.64	28	83	76		Clear.
Do do	July 7	6 a. m.	72.85	24	77	74		Clear; gentle breeze south.
Do do	do	6 p. m.	72.86	27	80	73½	1372	Gentle breeze SE.
Do do	July 8	4.30 a. m.	72.81	20	70	68		Hazy; very heavy dew.
Camp 11, Turkey creek	do	7 p. m.	72.26	25	78	72½		Wind SE.
Do do	July 9	4 a. m.	72.17	21½	73	70½		Cloudy; drizzling rain.
Camp 12, Little Arkansas river	do	7 p. m.	71.89	25	77½	73		Wind E. by S.; raining during the day.
Do do	July 10	4 a. m.	72.	23½	75	72½	1695	Appearance of rain; lightning, with thunder; wind E. by S.
Camp 13, branch of Cow creek	do	7 p. m.	71.88	26½	78½	76		Clear; has been raining most of the day.
Do do	July 11	4 a. m.	71.97	22	72	71	1703	Cloudy; heavy rain during night.
Camp 14. Arkansas river, where the Santa Fé road first strikes it.	do	7 p. m.	71.94	27	79	75		Very fair and calm.
Camp 14, Arkansas river, where the Santa Fé road first strikes it.	July 12	4.30 a. m.	71.99	20	69	67	1642	Heavy mist and dew.
Camp 15, on the Arkansas	do	7 p. m.	71.59	28	77½	73		Sun set fair; no wind.
Do do	July 13	4.30 a. m.	71.53	20	68½	67	1840	Misty.
Camp 16, Pawnee fork	do	7 p. m.	71.07	28	79	74		Light breeze from east.
Do do	July 14	6 a. m.	71.26	22	73	71½		Very fair.
Do do	do	7 p. m.	71.29	30	81½	74		Wind E. by S.
Do do	July 15	5.30 a. m.	71.40	22	72½	70	1932	Fair.
Do do	do	7 p. m.	71.49	27	79	71		Wind E. by S.
Do do	July 16	5 a. m.	71.60	19½	67	64		Fair; light breeze E. by S.
Camp 17, on the prairies, out of sight of, and about two miles from, the river.	July 17	5 a. m.	71.44	13	55	53	1797	Clear; light easterly wind.
Camp 18, on the prairie	do	7 p. m.	71.	23	70	58½		
Do do	July 18	5 a. m.	71.	17	61	57	2013	Wind east.
Camp 19, on the Arkansas	do	7 p. m.	70.85	26	76	67		Clear; strong breeze S. by E.
Do do	July 19	5.20 a. m.	70.44	16½	62	58½	2196	Clear; strong wind SE.
Camp 20, Jackson grove	do	7 p. m.	69.92	27	78	69½		Clear; strong wind south.
Camp 21, on the Arkansas	July 20	7.30 p. m.	69.50	26	80	68	2519	Wind E. by S.; clear.
Do do	July 21	8 a. m.	69.48	20	69½	64½	2652	Cloudy in the west.
Camp 22, on the Arkansas	do	7 p. m.	68.83	30	86	67	2940	Heavy clouds to the west, and furious wind about 8 p. m. from the same quarter.

Places of observation.	Date.	Time.	Barometer.	Thermometer. Attached.	Thermometer. Free.	Thermometer. Wet bulb.	Approximate altitude.	Remarks.
				C.	F.	F.		
Camp 22, on the Arkansas	July 22	7 a. m. ..	68.94	22½	74½	64	2940	
Camp 23, on the Arkansas	do	7 p. m. ..	68.67	30	86	66	2988	Clear; light breeze E. by N.
Do do	July 23	5 a. m. ..	68.79	19	67	65		Sky overcast in the west.
Camp 24, on the Arkansas	do	7 p. m. ..	68.10	26	81	70½	3268	Clear; light wind E. by S.
Do do	July 24	5.30 a. m.	68.28	19	68	63		Strong wind SE.; sky overcast to the west.
Camp 25, on the Arkansas	do	7 p. m. ..	67.94	29	83	74	3319	Clear; wind E. by S.
Do do	July 25	4.45 a. m.	67.95	21½	72	64¼		Clear; light breeze SE.
Camp 26, on the Arkansas	do	7 p. m. ..	67.75	30	84	61	3396	Clear; wind light, SE.
Do do	July 26	5 a. m. ..	67.82	23	71¼	62		Overcast in the west; wind south.
Camp 27, on the Arkansas	do	7 p. m. ..	67.29	29¼	84½	68	3594	Wind E. by S.; darkly overcast in the east.
Do do	July 27	5 a. m. ..	67.26	21	70	64		Clear, wind E. by S.
Camp 28, on the Arkansas	do	7 p. m. ..	66.69	25	74¼	65	3779	After a severe hail storm, with thunder and lightning, dark clouds in the east; appearance of more rain; wind SE.
Do do	July 28	5 a. m. ..	66.80	20	66	62		Clouds in west; no wind.
Camp 29, on the Arkansas	do	7 p. m. ..	66.51	29¼	78	62	3862	Clear; no wind.
Do do	July 29	5 a. m. ..	66.60	16	58	54		Clear.
Camp 30, near Bent's fort	do	7 p. m. ..	66.51	25	76	62	3942	Sky overcast in the NW.; strong wind NE.
Do do	July 30	6 a. m. ..	66.61	20	69	59½		Clear.
Do do	do	7 p. m. ..	66.42	29	84¼	67		Clear; wind E. by S.
Do do	July 31	6 a. m. ..	66.46	15	62	57		Clear.
Do do	do	7 p. m. ..	66.43	33	87	67		Clear; strong breeze E. by S.
Do do	August 1....	5 a. m. ..	66.38	18	64¼	55		Clear.
Do do	do	7 p. m. ..	66.21	32	86	62		Wind E. by S.; clear.
Do do	August 2....	6 a. m. ..	66.18	21	70	58		Clear.
Camp 31, on the Timpa	do	7 p. m. ..	65.10	31	86	61	4523	Clear; high wind SE.
Do do	August 3....	5.30 a. m.	65.11	21	71	57		Wind south.
Camp 32, on the Timpa	do	7 p. m. ..	64.74	30½	87	61	4761	Slight haze; wind south.

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Do do	August 4....	5 a. m. ..	64.81	21	71½	55	4761	Wind south.
Camp 33, Hole in the Prairie..	August 5....	5.30 a. m.	62.57	19	68	55	5560	Clear; wind W. by S.
Camp 34, on the Purgatory....	do	7 p. m. ..	61.79	25½	80	62	5896	Strong wind W. by S.
Do do	August 6....	5.30 a. m.	61.91	15	60	52		Clear; wind SW.
Camp 35, valley of the Raton ..	do	7 p. m. ..	58.93	22	70	53	7169	Clear.
Do do ..	August 7....	6 a. m. ..	59.04	14	59½	54½		Sky clear; sun just rising above the mountain.
Summit of the Raton..........	do	10.30 a. m.	58.01	25	74	......	7754	Fair.
Camp 36, on the Canadian	do	7 p. m. ..	61.28	23½	72	63	6112	Cloudy in the east after a slight chair.
Do do	August 8....	6 a. m. ..	61.27	12	57	52		Clear; no wind.
Do do	do	7 p. m. ..	61.26	23½	72	62½		Dark clouds in the west; calm.
Do do	August 9....	5.30 a. m.	61:30	11	53	51		Clear.
Camp 37....................	do	7 p. m. ..	61.27	22½	70½	66	6109	Sky overcast in the SW.; light shower on the March 4, p. m.
Do	August 10....	5 a. m. ..	61.26	12½	56	52		Wind SW.; hazy towards south.
Camp 38, on Cummaron Citon	do	7 p. m. ..	61.46	24	69½	58½	6027	Sky overcast in the west.
Do do	August 11....	5 a. m. ..	61.34	10	51	48½		Clear and calm.
Camp 39, on the Ocaté........	do	7 p. m. ..	59.43	23	71	63	6946	Cloudy, and overcast in the west.
Do do	August 12....	6 a. m. ..	59.56	16½	61½	53		Darkly overcast in the west; wind east.
Camp 40, at the Pools	do	7 p. m. ..	60.20	21	69	59	6670	Wind E. by N.; sky overcast in the west.
Do do	August 13....	6 a. m. ..	59.82	11½	52	49		Clear.
Camp 41, on the Sapillo	do	6 p. m. ..	60.65	20½	68	64	6395	Just cleared off after a very heavy shower from the SW.
Do do	August 14....	5.30 a. m.	60.60	14½	56½	54		Clear and calm.
Camp 42, at the village of the Vegas.	do	6 p. m. ..	60.69	24	72	69	6418	Clear and calm.
Camp 42, at the village of the Vegas.	August 15....	6 a. m. ..	60.65	13	55	54		Clear and calm.
Camp 43, Vernal Springs	do	6 p. m. ..	60.87	28	75	65	6299	Clear and calm.
Do do	August 16....	5.30 a. m.	60.98	14	57½	53		Clear and calm.
Camp 44, half mile south of the Pecos.	do	6 p. m. ..	60.76	25	75	63	6346	Sky overcast in the west.
Camp 44, half mile south of the Pecos.	August 17....	5.30 a. m.	60.82	14	57	53		Clear and calm.
Camp 45, on the Pecos, near Peco's village.	do	6 p. m. ..	59.73	21½	69	65	6366	Light wind and rain from east.
Camp 45, on the Pecos, near Peco's village.	August 18....	5.15 a. m.	59.72	15½	61½	59		Heavy clouds and mist; rain throughout the night.
Santa Fé....................	August 19....	6 a. m. ..	59.56	14	59	55½	6846	Sky clouded; looks like rain; calm.
Do	do	6 p. m. ..	59.52	20½	67	59		Sky clear; no wind.
Do	August 20....	7 a. m. ..	59.61	18½	62½	59		Clear.

APPENDIX No. 3.—METEOROLOGICAL OBSERVATIONS—Continued.

Places of observation.	Date.	Time.	Barometer.	Thermometer.			Approximate altitude.	Remarks.
				Attached.	Free.	Wet bulb.		
				C.	F.	F.		
Santa Fé	August 20	6 p. m.	59.50	19	64	58		Clear; wind E. by N.
Do	August 21	6 a. m.	59.84	18	58¼	56		Clear.
Do	do	6 p. m.	59.75	18	58¾	55		Cloudy after rain.
Do	August 22	6 a. m.	60.03	17	57	53		Clear and calm.
Do	do	6 p. m.	59.80	19	63	58½		do
Do	August 23	7 a. m.	59.97	17¾	60	55		do
Do	do	6 p. m.	59.71	21	64	60		do
Do	August 24	7 a. m.	59.83	19	61	56		Clear.
Do	do	6.30	59.53	22	65½	61		do
Do	August 25	8 a. m.	59.67	20	64	56½		Clear; gentle breeze N. by E.
Do	do	6 p. m.	59.78	19	62	58		Raining; wind NE.
Do	do	7.30 a. m.	60.04	19	62	57	6816	Sky overcast; looks like rain; no wind.
Do	August 26	6 p. m.	59.92	20	60½	56¼		Clear.
Do	August 27	7 a. m.	60.01	17	57⅛	52¾		do
Do	do	6 p. m.	59.82	21½	63¼	57		Calm and clear.
Do	August 28	8 a. m.	59.87	19	60	56		do
Do	do	6 p. m.	59.74	22	71	58		do
Do	August 29	7 a. m.	59.88	20	62	51⅛		do
Do	do	6 p. m.	59.69	22¼	74	61½		Clear and calm.
Do	August 30	8 a. m.	59.77	19¼	66¼	54¾		do
Do	do	6 p. m.	59.47	23¾	75	59		do
Do	August 31	6 p. m.	59.37	22	70	58		Clear.
Do	September 1	7 a. m.	59.50	18	61	54		Clear and calm.
Do	do	6 p. m.	59.35	21½	69¼	60		do
Camp 47, Galisteo creek	September 2	6 p. m.	63.92	27¾	80¼	62	....	Clear; wind SW.
Salisteo creek	September 3	6 a. m.	62.58	14⅛	56	51	....	Clear and fair.
Camp 48, two miles below San Felipe.	do	5.45	63.15	27	77	63	5158	Clear and calm.

San Felipe	September 4	6 a. m.	63.45	18	61	......	5158	Gentle wind E. by S.
Camp 49, quarter of a mile south of the Alameda.	do	5.30 p. m.	64.08	24½	75	59	....	Fair; wind NW.
Camp 49, quarter of a mile south of the Alameda.	September 5	6 a. m.	63.63	13½	54	51	....	Fair and calm.
Camp 50, on the Rio del Norte, 8½ miles below Albuquerque	do	6 p. m.	63.61	24½	74½	58	....	Wind SW.
	September 6	6.30 a. m.	63.85	10	51	49	....	Fair and calm.
Camp 51, near Pualta, almost 500 feet NW. of the Chavez church.	September 7	7.15 a. m.	64.06	17	63	55	4862	
Camp 52, about one mile north of Tomé.	do	6.30 p. m.	64.39	29½	74	62	....	Calm and clear.
Camp 52.	September 8	6.30 a. m.	64.26	14	57	53	....	Fair and calm.
Camp 54, on the return, same as camp 49.	September 9	6 p. m.	63.17	21½	67	57	....	Clear and calm.
Camp 54, on the return, same as camp 49.	September 10	7 a. m.	63.53	8½	50	48	....	do
Camp 55, about one mile south of San Felipe.	do	6 p. m.	63.47	25	67	57	....	Calm and clear.
Camp 55, about one mile south of San Felipe.	September 11	7 a. m.	63.86	8½	46	......	....	do
Camp 56.	do	6 p. m.	61.94	28½	73½	58	....	do
Do	September 12	6 a. m.	62.01	14	56	......	....	Clear; wind E. by S.
Santa Fé.	September 13	8 a. m.	59.70	21	69	59	....	Clear and calm.
Do	do	6 p. m.	59.57	24½	74	61½	....	Sky overcast in the south; wind E. by S.; light refreshing shower at 4 p. m.
Do	September 14	6 p. m.	59.77	22	70½	63	....	Sky overcast immediately after a shower; no wind.
Do	September 15	7 a. m.	59.91	21	68	58	....	Calm and clear.
Do	do	6 p. m.	59.73	19½	65	......	....	Just clearing off after a shower; wind NE.
Do	September 16	8 a. m.	59.67	20	66½	59	....	Clear and calm.
Do	do	6 p. m.	59.54	22	70½	52	....	Calm and clear.
Do	September 17	8 a. m.	59.75	19	64	54	....	Clear and calm.
Do	do	6 p. m.	59.58	23	71	56	....	do
Do	September 18	6 p. m.	59.66	23	74½	62	....	Calm and clear.
Do	September 19	7 a. m.	59.80	20	65	54	....	do
Do	do	6 p. m.	59.65	22	71	54	....	Sky overcast in the south; faint thunder.
Do	September 20	8 a. m.	59.79	19¾	66	52		
Do	do	5.30 p. m.	59.75	22	71	53½	....	Clear and calm.
Do	September 21	7.30 a. m.	59.91	18	63	51	....	Clear; light wind E. by S.

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APPENDIX No. 3.—METEOROLOGICAL OBSERVATIONS—Continued.

Place of observation.	Date.	Time.	Barometer.	Thermometer.			Approximate altitude.	Remarks.
				Attached.	Free.	Wet bulb.		
				C.	F.	F.		
Santa Fé	September 21	6 p. m.	59.66	22	72	63	....	Light shower of rain; wind NE.
Do	September 22	6 p. m.	59.35	20	67½	57	....	Sky overcast; wind west.
Do	September 23	7 a. m.	59.41	17	58½	51	....	Clear.
Do	do	6 p. m.	59.28	21	66½	56	....	Calm and clear.
Do	September 24	7 a. m.	59.49	16	59	53	....	Fair; wind from NE.; a heavy shower during the night.
Camp 57	September 25	6 p. m.	62.13	20¼	63	50½	5820	Fair and calm.
Do	September 26	5.45 a. m.	62.08	3	36	......		During the night high wind E. by N.
Camp 58, where the road strikes the river Del Norte.	do	6 p. m.	63.88	24	65	53	4910	Calm and clear.
Camp 58, where the road strikes the river Del Norte.	September 27	6 a. m.	64.06	6¼	40	......		do
Camp 59, about one mile south of San Dia.	do	6 p. m.	64.08	23	68	53	4846	do
Camp 59, about one mile south of San Dia.	September 28	6 a. m.	64.12	5	40	37½		
Camp 60	do	6 p. m.	63.93	25	63	58	6904	do
Do	September 29	6 a. m.	64.07	5	33	37		do
Camp 61. First camp on the west side of the Rio del Norte, about 7 miles below Albuquerque.	do	6 p. m.	64.27	21½	67	56	4756	do
Camp 61. First camp on the west side of the Rio del Norte, about 7 miles below Albuquerque.	September 30	6 a. m.	64.32	3	36	37		do
Camp 62, 7 miles below Isoletta	do	6 p. m.	64.53	26¼	70¼	58	4636	Clear and calm.
Do do	October 1	6 a. m.	64.70	12¼	51	47		Calm and clear.

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Camp 63, below Tomé 9 miles	do	6 p. m.	64.59	25½	69	54	4670	No wind; clear.
Do do	October 2	6 a. m	64.48	4½	37	35		Clear and calm.
Camp 64	do	6 p. m.	64.65	30½	70½	57	4615	do
Do	October 3	6 a. m	64.70	4½	38½	39		do
Do	do	6 p. m.	64.66	29	72	55		do
Do	October 4	6 a. m.	64.65	5	40	38		Calm and clear.
Camp 65	do	6 p. m.	64.79	26	7½	54	4556	Clear and calm.
Do	October 5	6 a. m.	64.76	5½	41	37		do
Camp 66, near Socorro	do	5.30 p. m.	61.72	27	72½	56	4563	Calm and clear; strong breeze from SE. during the afternoon.
Do do	October 6	6 a. m.	64.83	11	51	45		Clear; light wind south.
Camp 67	do	6 p. m.	64.79	25	75	57	4595	Sky overcast in east, and a strong wind from south.
Do	October 7	6 a. m.	64.56	10	50	46		Clear and calm.
Camp 68	do	6 p. m.	64.72	24	71	58	4576	Strong wind from south; which has been blowing all day.
Do	October 8	6 a. m.	64.74	10½	48	42		Clear and calm.
Camp 69	October 9	6 a. m.	65.16	1½	34½	33½	......	do
Camp 70, east side of the Del Norte.	do	5.30 p. m.	65.24	24½	71¼	54	4241	Fair; light wind from south, which has blown strong from the same quarter during the day.
Camp 70, east side of the Del Norte.	October 10	6.30 p. m.	65.26	1½	35	......		Clear and calm.
Camp 70, east side of the Del Norte.	do	5.30 p. m.	65.37	20½	62	48		Clear; wind S. by W.
Camp 70	October 11	6 a. m.	65.73	1	30	......		Clear and calm.
Do	October 12	6.30 a. m.	65.99	1¼	30	......		do
Do	do	5.30 p. m.	65.74	25	69	57		do
Do	October 13	6 a. m.	65.85	1¼	27	......		do
Camp 71	do	5.30 a. m.	65.73	20	66	50	4138	do
Do	October 4	6 a. m.	65.76	2	34	......		do
Camp 72	do	5.30 p. m.	65.73	26	72	56	4164	Clear; light wind from the south.
Do	October 15	6 a. m.	65.68	6	42	40		Clear and calm.
Camp 73. First after leaving the Del Norte.	do	5.30 p. m.	64.15	26	76	53	4810	Clear; light wind S. by W.
Camp 73	October 16	6 a. m.	64.22	9	48½	......		Clear; light wind SW.
Camp 74	do	5.15 p. m.	63.99	22	70	51	5229	Light clouds; wind strong from SW.
Do	October 17	6 a. m.	63.06	3	35½	......		Clear; no wind.
Camp 75, in the mountains, between the Del Norte and copper mine.	do	5 p. m.	62.73	16	61¼	49	5426	Clear; light wind south.

APPENDIX No. 3.—METEOROLOGICAL OBSERVATIONS—Continued.

Place of observation.	Date.	Time.	Barometer.	Thermometer.			Approximate altitude.	Remarks.
				Attached.	Free.	Wet bulb.		
				C.	F.	F.		
Camp 75, in the mountains, between the Del Norte and copper mines.	October 18	6 a. m.	62.73	2¼	27½	......	5426	Calm and clear.
Top of hill No. 1, between camp 75 and 76.	do	11 a. m.	61.98	14	59	......	....	Clear; no wind.
Top of hill No. 2	do	11.40 a. m.	61.73	20	64			
Top of hill No. 3	do	1 p. m.	60.63	23	72	......	6387	
Camp 76, near the copper mines	do	5 p. m.	61.30	16	58	49	6167	Clear and calm.
Camp 76	October 19	5.30 a. m.	61.28	3	35	......		do
Top of hill	do	1.22 p. m.	61.29	19½	66	......	....	Cloudy in the west; indications of rain from that quarter.
Camp 77	October 20	6.30 a. m.	64.77	2¼	37	......	4587	Clear sunrise.
Camp 78, on the Gila	do	5 p. m.	65.58	21	70	54	4347	Clear and calm.
Do do	October 21	6 a. m.	65.64	4¼	40	......		Cloudy; no wind.
Camp 79, on the Gila	do	5 p. m.	66.22	23½	71	56	4096	Light breeze south; clear.
Do do	October 22	6 a. m.	66.38	7	44	43		Cloudy and calm.
Camp 80, on the Gila	do	5 p. m.	66.65	24	74	56	3989	Clear; wind east.
Do do	October 23	6 a. m.	66.63	13	57	49		Cloudy in the west; no wind.
Camp 81, on the Gila	do	5 p. m.	67.08	21¼	74	54	3732	Clear; wind south.
Do do	October 24	6 a. m.	66.94	4	27	......		Clear and calm.
Do do	do	5 p. m.	66.93	20¼	69	53		Clear; light wind SW.
Do do	October 25	6 a. m.	66.84	3	27¼	......		Clear and calm.
Camp 82, on the Gila	do	5.30 p. m.	67.22	20	66¼	50	3615	Sky bright; no wind.
Do do	October 26	6 a. m.	67.38	1¼	34	......		Sky clouded in the west; light air from NE.
Camp 83, on the Gila, about 50 feet above the river.	do	5 p. m.	68.17	23	70	50	3147	Bright clouds; wind light E. by N.
Top of ridge between camp 82 and 83, on the road.	do	11.40 a. m.	63.58	20	63	51	....	Fair, with light wind from east.

Camp 83, on the Gila	October 27	6.30 a. m.	68.31	12	54½	46		Sky overcast; wind east; very light; rain during the night.
Do do	do	5 p. m.	68.33	17	62	52	3147	Very light rain at intervals during the day, and faint thunder; strong wind now from NE.
Do do	October 28	6 a. m.	68.35	12½	55½	50		Wind east; sky overcast; looks like rain.
Camp 84, on the Gila, about 20 feet above the river.	do	5 p. m.	68.87	20	65	55	2969	Sky bright, but clouds; calm.
Camp 84	October 29	6 a. m.	68.91	1	35	......		Calm; foggy in the west.
Camp 85, on the Gila, 20 feet above the river.	do	5 p. m.	69.40	20½	66	52	2852	Calm and clear.
Camp 85, on the Gila, 20 feet above the river.	October 30	6 a. m.	69.03	4	39½	......		Brilliant clouds in the east immediately before sunrise; calm.
Camp 86, 10 feet above the river	do	5 p. m.	69.53	18½	63	......	2674	Wind moderate south; sky overcast in the west.
Do do	October 31	6 a. m.	69.72	2¾	36	......		Calm; misty around horizon; light clouds overhead.
Camp 87, on the Rio San Francisco, about two miles from the mouth, at the Gila.	do	5 p. m.	69.82	19	64	52	2557	Clear and calm.
Camp 87, on the Rio San Francisco, about two miles from the mouth, at the Gila.	November 1	6 a. m.	69.90	3	25	......		Clear; no wind.
Ridge between 87 and 88	do	2.35 p. m.	64.82	21	62	......	4763	
Top of peak near camp 88, about 1½ miles west.	do	p. m.	62.58	19	61	......	5724	Wind light W. by S.; sky clear.
Camp 88, in the mountains, on the trail cutting off a bend of the Gila.	do	5 p. m.	64.66	14	54½	42	4748	Clear and calm.
Camp 88, in the mountains, on the trail cutting off a bend of the Gila.	November 2	6 a. m.	64.54	06	40½	......		Slightly overcast; calm.
Camp 89, Disappointment creek	do	5 p. m.	66.81	19	61	55		Clear; light air SE.
Do do do	November 3	6 a. m.	66.95	1¼	32	......	3781	Clear and calm.
Do do do	do	5 p. m.	67	19¼	63	55		do
Do do do	November 4	6 a. m.	66.91	06	44	40		Sky overcast; no wind.
Camp 90, on the Gila	November 5	6 a. m.	70.99	13½	57	47	2172	Cloudy and thick mist around the horizon; wind SE.
Camp 91, on the San Pedro	do	5 p. m.	71.30	21¼	67	52		Clear and calm.
Do do	November 6	5 p. m.	71.22	24	68¼	58	2115	do
Do do	November 7	6 a. m.	70.98	1	33	......		do

APPENDIX No. 3.—METEOROLOGICAL OBSERVATIONS—Continued.

Place of observation.	Date.	Time.	Barometer.	Thermometer. Attached.	Thermometer. Free.	Thermometer. Wet bulb.	Approximate altitude.	Remarks.
				C.	F.	F.		
Camp 92, on the Gila	November 7	5 p. m.	70.79	20	69	50½	2122	Dark clouds in the west; wind south.
Do do	November 8	6 a. m.	71.72	5	41	......		Heavy rain during the night; morning foggy; no wind.
Camp 93, on the Gila	do	5 p. m.	71.98	14	53	48½	1751	Calm and clear.
Do do	November 9	6 a. m.	71.94	4	37	......		Heavy frost this morning; sky clear.
Camp 94—Carson's Plains, on the Gila.	do	5 p. m.	72.27	15	55	50	1596	Clear and calm.
Camp 94—Carson's Plains, on the Gila.	November 10	6 a. m.	72.35	3	27	......		Sun not risen; sky murky; no wind.
Camp 95—Carson's Plains, on the Gila.	do	5 p. m.	72.93	19	65	53	1419	Clear and fair.
Camp 95—Carson's Plains, on the Gila.	November 11	6 a. m.	73.00	4	37	......		do.
Camp 96, in the Pijmos village, on the Gila.	do	5 p. m.	73.23	23½	71	60	1308	Calm and fair.
Camp 96, in the Pijmos village, on the Gila.	November 12	6 a. m.	73.25	5	40	......		Sky clear; bright clouds in the east as the sun is rising; no wind.
Camp 97, about 4 miles from the Gila, after passing the Pijmo village.	do	5 p. m.	73.69	20	64	51	1150	Clear and calm.
Camp 97, about 4 miles from the Gila, after passing the Pijmo village.	November 13	6.30 a. m.	73.48	3	26	......		do.
Camp 98, on trail of the cut-off, — miles from the Gila.	do	7.30 p. m.	72.35	14	56	......	1644	Calm; stars shining bright. Left camp 98 at 4 a. m. on the 14th; too early for morning observation.

Camp 99, on the Gila..........	November 14	5 p. m....	73.87	18	63	57½	845	Calm; clear.
Do do	November 15	7.15 a. m.	74.22	7	44	......		Calm; clouds and mist around the horizon; we had rain in the night, which commenced about 12 o'clock, and lasted two hours.
Do do	do	5 p. m....	74.64	15	58	48		Clear and calm.
Do do	November 16	6.15 a. m.	74.83	4	24	......		Clear; no wind.
Camp 100, on the Gila.........	do	5 p. m....	75.13	14	52½	48	501	Brilliant sunset; clear and calm.
Do do	November 17	6.45 a. m.	75.42	12	44	......		Sky clear; strong wind from the west.
Camp 101, on the Gila.........	do	5 p. m....	75.77	16	56	45	293	Clear and calm.
Do do	November 18	6 a. m....	75.90	5	20½	......		Sky clear; no wind.
Camp 102, on the Gila.........	do	5 p. m....	76.5	13	50	42	231	Calm and clear.
Do do	November 19	6 a. m....	75.92	5	21	......		Calm and clear; thermometer, noon, 72.
Camp 103, on an island of the Gila.	do	5 p. m....	76.02	15	52	46	236	Calm and clear.
Camp 103, on an island of the Gila.	November 20	6 a. m....	75.98	3	24½	......		Sky clear; no wind. At noon, on the march, thermometer 74.
Camp 104, on the Gila.........	do	5 p. m....	76.12	20	56	48	248	Fair and calm.
Do do	November 21	6 a. m....	75.85	5	19	......		Sun not risen; calm and clear.
Camp 105, on the Gila.........	do	5 p. m....	76.10	19	61	53	253	Clear and fair.
Do do	November 22	6 a. m....	75.94	2	33	......		Sky clear; star light; no wind.
Camp 106, near the mouth of the Gila.	do	5 p. m....	75.67	23	69	51	254	Clear and calm.
Camp 106, near the mouth of the Gila.	November 23	7.30 a. m.	75.57	9¼	49½	......		Sun obscured by clouds.
Camp 106, near the mouth of the Gila.	do	5 p. m....	76.17	16	60	43		Strong wind from the east, which has been blowing all day; has just subsided; sky clouded, and misty around the horizon.
Camp 106, near the mouth of the Gila.	November 24	6 a. m....	76.88	7	40	......		Wind northeast; clear.
Camp 107, on the east bank of the Rio Colorado.	do	5 p. m....	76.84½	13¼	59½	44	....	Clear sunset; calm.
Camp 107, on the east bank of the Rio Colorado.	November 25	6 a. m....	76.54	3	27	......	....	Bright clouds in the east; before sunrise; no wind.
Camp 108, first camp on the Jornada.	do	5 p. m....	76.28	16	57½	46	210	Camp on the Jornada; calm and fair.
Camp 108, first camp on the Jornada.	November 26	5 a. m....	75.93	5	21	......		Before daylight; stars shining bright; calm.
Camp 109, at an old mill on the Jornada.	do	5 p. m....	76.28	18	60	......	176	Clear and calm.

APPENDIX No. 3.—METEOROLOGICAL OBSERVATIONS—Continued.

Place of observation.	Date.	Time.	Barometer.	Thermometer. Attached.	Thermometer. Free.	Thermometer. Wet bulb.	Approximate altitude.	Remarks.
				C.	F.	F.		
Camp 109, at an old mill on the Jornada.	November 27	6.30 a. m.	76.14	1	32	......	176	
Camp 110—Salt Lake, on the Jornada.	do	9 p. m....	76.55	6½	45½	......	52	Clear; bright moon, and star-light.
Camp 111, on the Jornada, Cariso creek.	November 28	5 p. m....	75.40	16	59½	52		Calm and clear.
Camp 111, on the Jornada, Cariso creek.	November 29	6.30 a. m.	75.56	3	36½	......	445	Foggy around the western horizon; bright clouds in the east; just before sunrise; light wind from the west.
Camp 112....................	do	5 p. m....	72.71	17	60	51		Heavy clouds around the western horizon, and wind from the same quarter.
Do	November 30	7 a. m....	72.66	11	50½	......	1539	Dark, heavy clouds hanging over the mountains in the west; sky bright in the east.
Do	do	5 p. m....	72.39	11¼	53	......		High wind from the west, and cloudy in the same quarter.
Camp 112, Valle Citron........	December 1	6.30 a. m.	72.50	7	39	......	....	Sky clear of clouds, but misty around the western horizon; wind continues from west.
On the Divide	do	12.20 p. m.	69.64	11	49	......	2670	Clear; wind high from the west.
Camp 113....................	do	5 p. m....	70.37	8	42	......		High wind from the west, and heavy clouds in the same quarter.
Do	December 2	6.30 a. m.	70.41	5	38	......	2331	Night damp; heavy dew this morning; wind moderate from the west; sky bright in the east, but overcast in the opposite quarter.
Camp 114, at Warner's "Agua Caliente."	do	5 p. m....	68.75	8	47½	43	3013	Calm and clear.

Camp 114, at Warner's "Agua Caliente."	December 3	6.30 a. m.	68.66	2½	28	......		Heavy frost; sky overcast; no wind.
Camp 114, at Warner's "Agua Caliente."	do	5 p. m....	68.67	11	49	46	3013	Sky darkly overcast; light wind west.
Camp 114, at Warner's "Agua Caliente."	December 4	7 a. m....	68.50	5	40½	41		Cloudy; heavy mist; appearance of rain.
Camp 115, Santa Isabella, on Captain Storer's rancho.	December 5	do	68.50	4	38	......	3050	Wind west; raining, and heavy mist around the horizon.
Camp 117, San Pascual........	December 6	5 p. m....	75.38	11½	52	47½	716	Day fair throughout; clear sunset; wind moderate from SW.
Do do	December 7	7.45 a. m.	75.75	5½	36	......		Clear; wind moderate SE.
Camp 118....................	December 8	6.30 a. m.	75.39	1½	33	......		Heavy frost; no wind; sky overcast with dark clouds.
Do	do	5 p. m....	75.23	11	50½	......		Clear; wind NW.
Do	December 9	6.30 a. m.	....	......	35	......	477	Fair and calm.
Do	do	5 p. m....	75.54	12½	53	......		do
Do	December 10	6.30 a. m.	....	......	30	......		
Do	December 11	do	....	......	31	......		
San Diego....................	December 13	5 p. m....	76.41	14	57	......		Wind high SE. It rained during last night, and this morning until noon, with the wind from same quarter.
Do	December 14	Sunrise...	....	......	55	......		Clear and calm.
Do	do	5 p. m....	76.80	16	61	58		Light clouds; calm.
Do	December 15	8 a. m....	77.03	14	59	56½		Thick mist around the horizon; light air from south.
Do	do	5 p. m....	76.94	14	59	56	30	Sky cloudy; calm; light rain at noon.
Do	December 16	8 a. m....	76.76	13	57	52		Sky clear; fair and calm.
Do	December 17	8.30 a. m.	76.55	12	55½	......		Sky overcast; calm.
Do	do	5 p. m....	76.37	15	59½	55½		Sky slightly overcast; no wind.
Do	December 18	8.30 a. m.	76.70	13	56	52		Clear and calm.
Do	do	5 p. m....	76.55	17	62	58		Sunset brilliant; no wind; fair.
Do	December 19	9.15 a. m.	76.81	14	59	54		Sky clouded; looking like rain; calm.
Do	do	5 p. m....	76.76	15½	62½	58	....	Brilliant sunset; clear and calm.
Do	December 20	8.30 a. m.	77.	14	58½	54	....	Cloudy; no wind.
Do	do	5 p. m....	76.82	15	61	58	....	Clear; brilliant sunset; calm.
Do	December 21	8.30 a. m.	76.97	13½	57	54	....	Quite fair and calm.
Do	do	5 p. m....	76.72	16	61	56	....	Clear and calm.
Do	December 22	8.30 a. m.	76.81	14	58½	54	....	Fair; no wind.
Do	do	5 p. m....	76.73	15½	62½	59½	....	Cloudy in the west; calm.
Do	December 23	8 a. m....	76.80	15	60	56½	....	Sky clouded and darkly overcast; looks like rain; no wind.

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APPENDIX No. 3.—METEOROLOGICAL OBSERVATIONS—Continued.

Place of observation.	Date.	Time.	Barometer.	Thermometer.			Approximate altitude.	Remarks.
				Attached.	Free.	Wet bulb.		
				C.	F.	F.		
San Diego	December 23	5 p. m.	76.83	16	$60\frac{1}{8}$	$57\frac{1}{2}$	....	Brilliant sunset; just clearing off; no wind.
Do	December 24	8.45 a. m.	76.77	15	59	55	....	Cloudy; wind light NE.
Do	do	5 p. m.	76.58	17	$60\frac{1}{2}$	$57\frac{1}{4}$	....	Cloudy in the west; calm.
Do	December 25	8.30 a. m.	76.42	15	60	57	....	Clear and calm.
Do	do	5 p. m.	76.47	18	65	62	....	Wind east; brilliant sunset; fair.
Do	December 26	8.30 a. m.	76.66	17	63	......	....	Raining moderately, though steady; no wind.
Do	do	5 p. m.	76.52	17	64	59	....	Clear and calm.
Do	December 27	8.30 a. m.	76.72	16	$60\frac{1}{4}$	59	....	Wind NW.; quite fair. We had a heavy shower during the night.
Do	do	5 p. m.	76.70	16	60	56	....	Clear and calm.
Do	December 28	do	76.75	16	60	55	....	Clear sunset; wind N. by W.
Do	December 29	8 a. m.	76.55	14	56	52	....	Cloudy; no wind.

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APPENDIX No. 4.

TABLE

OF

GEOGRAPHICAL POSITIONS.

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APPENDIX No. 4.

TABLE OF GEOGRAPHICAL POSITIONS.

Date.		Places of observation.	Distances measured by the viameter.		North latitudes.	West of Greenwich.		Authorities.
			Distance from camp to camp.	Total distance from Fort Leavenworth.		In time.	In arc.	
1846.					*Deg. min. sec.*	*H. min. sec.*	*Deg. min. sec.*	
June	23	Fort Leavenworth, on the Missouri ...	....	....	39 21 14	6 18 56	94 44 00	Latitude of Fort Leavenworth by W. H. Emory. Longitude of Fort Leavenworth by J. N. Nicollet.
	30	Camp 4, Oregon trail, about one mile from where it strikes the Wakarcissi creek	43	43	38 54 08	6 20 08	....	W. H. Emory.
July	4	Camp 8, Big John Spring	81	124	38 39 28	6 24 58	....	do
	5	Camp 9, Diamond Spring........	20	144	....	6 26 09	....	do
	6	Camp 10, Cotton-wood creek	29	173	38 29 30	6 28 07	....	do
		Camp 13, Cow creek	58	231				
	11	Camp 14, bend of the Arkansas river, where the road strikes it	22	253	38 21 17	6 33 28	....	do
	13	Camp 16, Pawnee Fork........	35	288	38 10 10	6 35 41	....	do
	19	Camp 20, Jackson Grove........	64	352	37 41 38	6 38 22	....	do
	22	Camp 23, Arkansas, on the river........	66	418	37 57 39	6 42 29	....	do
	25	Camp 26, Arkansas, on the river........	64	482	38 01 08	6 46 44	....	do
	30	Camp 30, Bent's Fort........	82	564	38 02 53	6 52 04	103 01 00	do
Aug.	3	Camp 32, on the Timpa........	34	598	37 44 56	6 54 16	....	do
	5	Camp 34, on the Purgatory........	53	651	37 11 59	6 56 47.9	....	do
	6	Camp 35, on the Raton	17	668	37 00 21	6 57 01	....	do
	7	Camp 36, on the Canadian	17	685	36 47 34	6 56 59	....	do

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	10	Camp 38, on the Cimmaron Citron....	30	715	36	27	50	6	58	39	104	39	45	do
	12	Camp 40, at the Pools, about one mile west of the road	50	765	35	51	21	6	59	49	104	57	15	do
	14	Camp 42, about one mile south of the Vegas..........................	27	792	35	35	05	7	00	46	105	11	30	do
	15	Camp 43, Vernal Springs............	19	811	35	23	19	7	01	23	105	20	45	do
		Camp Santa Fé.....................	62	873	35	41	06	7	04	05.5	106	01	23	do
Sept.	10	Camp on the Rio del Norte, about one mile below San Felippe	33	911	35	25	30	7	06	16.2	106	34	04	do
	4	Camp on the Rio del Norte, near the Alameda	....	....	35	11	20	7	07	00	106	45	00	do
	6	Camp at Peralta, near Señora Chavis's private chapel..................	....	....	34	50	57	7	07	08.4	106	47	06	do
	30	Camp 62, a little south of, and about one mile west of Peralta.	48	959	34	48	33	7	07	14.2	106	48	33	do
Oct.	4	Camp 65, west bank of Rio del Norte, about two miles below Limatar...	52	1011	34	07	30	7	07	54	106	53	29	do
	7	Camp 68, west bank of Rio del Norte.	37	1048	33	41	19	7	08	14	107	03	36	do
	9	Camp 70, east bank of Rio del Norte.	....	....	33	20	02	7	08	57	107	04	17	do
	15	Camp 73, first camp after leaving Rio del Norte......................	63	1116	32	55	04	7	10	25	107	36	15	do
	17	Camp 75, in the mountains, between the Del Norte and Copper Mines..	38	1154	32	42	11	7	12	00	108	00	00	do
	19	Camp 77, Night creek	47	1201	32	50	51	7	14	32	108	38	00	do
	20	Camp 78, first camp on the Rio Gila..	8	1209	32	50	03	7	15	00	108	45	00	do
	22	Camp 80............................	....	....	32	38	13	7	16	50	109	07	30	do
	24	Camp 81, on the Gila...............	51	1259	32	44	52	7	17	23	109	22	00	do
	26	Camp 83, on the Gila...............	38	1297	32	53	16	7	18	06.3	109	31	31	do
	30	Camp 86, on the Gila...............	63	1360	33	12	10	7	21	23	110	20	46	do
	31	Camp 87, on the San Francisco, about two miles from its mouth.........	9	1369	33	14	29	7	22	01.6	110	30	24	do
Nov.	2	Camp 89, Disappointment creek......	21	1390	33	14	51	7	23	00.4	110	45	06	do
	5	Camp 91, on the San Pedro, near its mouth..............................	33	1423	32	57	43	7	23	19.5	110	49	53	do
	8	Camp 93, on the Gila...............	29	1457	33	05	40	7	24	52.6	111	13	10	do
	10	Camp 95, on the Gila...............	37	1494	23	.04	21	7	27	03.8	111	45	58	do
	12	Camp 97, between Pijmos and Coco Maricopas villages................	23	1517	33	09	23	7	28	28.8	112	07	13	do
	14	Camp 99, on the Gila	44	1561	32	59	22	7	31	20	112	50	01	do
	17	Camp 101, on the Gila..............	39	1600	32	55	52	7	33	41.6	113	25	25	do
	19	**Camp 103, on an island in the Gila...**	**39**	**1639**	**32**	**43**	**38**	**7**	**35**	**50.7**	**113**	**57**	**41**	**do**

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APPENDIX No. 4—GEOGRAPHICAL POSITIONS—Continued.

Date.		Places of observation.	Distances measured by the viameter.		North latitudes.			West of Greenwich.						Authorities.
			Distance from camp to camp.	Total distance from Fort Leavenworth.				In time.			In arc.			
1846.					Deg.	min.	sec.	h.	min.	sec.	Deg.	min.	sec.	
Nov.	21	Camp 105, on the Gila............	26	1665	32	43	17	7	37	22.8	114	20	43	W. H. Emory.
	22	Camp 106, about one and a half mile south of the junction of the Gila and Colorado of the west	22	1687	32	42	09	7	38	28.6	114	37	09	do
	25	First camp after leaving the Rio Colorado	22	1709	32	40	22	7	39	45.8	114	56	28	do
	28	Camp 111, Cariso creek............	77	1786	32	52	33	7	44	24.6	116	06	09	do
	29	Camp 112, Valle Citon.............	16	1802	32	58	15	7	45	22.7	116	20	40	do
Dec.	2	Camp 114, a few hundred yards south of Warner's rancheria	35	1837	33	16	57	7	46	34.8	116	38	43	do
	7	Camp 118, battle ground of the 7th ..	50	1887	33	03	42	7	48	14	117	03	29	do
		San Diego, (public square)..........	29	1916	32	45	00	7	48	41	117	11	00	Latitude by W. H. Emory. Longitude by Sir Ed. Belcher.

APPENDIX No. 5.

TABLE

OF

ASTRONOMICAL OBSERVATIONS.

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APPENDIX No. 5.

ASTRONOMICAL OBSERVATIONS.

NOTE.—The lunar distances were reduced by Professor Hubbard, by Bessel's method, which is presumed to be the most accurate method known. The important changes made in the longitude of one or two leading positions, must, therefore, depend for authentication upon the observations themselves.

These observations have not, in all cases, been multiplied to the extent desired, owing to the nature of the service on which the undersigned was employed; but there is no reason on the face of them for doubting the results deduced.

W. H. EMORY.

June 21, 1846.—*Fort Leavenworth.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	01	46.5	102	00	20	6	53	14.9
4	04	52	103	09	35	6	53	14.8
4	06	15.2	103	40	30	6	53	15.4
4	07	30.0	104	08	20	6	53	15.7
4	08	27.1	104	29	35	6	53	16.0
4	09	56.7	105	02	30	6	53	17.6
4	11	18.5	105	33	30	6	53	16.6
4	12	46.2	106	07	20	6	53	14.1
4	13	57.3	106	53	35	6	53	15.0
4	15	59	107	18	40	6	53	16.7

Thermometer 60°.

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APPENDIX No. 5—Continued.

June 21, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, p. m.			Double altitude of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	27	39.8	126	57	50	6	53	19.2
4	29	18.0	126	08	10	6	53	17.4
4	30	32.0	125	46	50	6	53	20.2
4	32	30.2	125	10	20	6	53	18.5
4	33	59.1	124	44	00	6	53	20.2
4	35	31.5	124	14	40	6	53	17.0
4	37	14.7	123	43	00	6	53	18.1
4	38	52.8	123	12	05	6	53	17.2
4	40	35.3	122	41	15	6	53	21.9 rej.
4	42	17.0	122	08	00	6	53	18.7

Thermometer 60°.

	h.	*m.*	*s.*
Chronometer fast by 10 obs. of east star........	6	55	15.68
Chronometer fast by 9 obs. of west star			18.50
Mean..	6	53	17.09

DETERMINATION OF INDEX ERROR.

	m.	*s.*
Off the arc....................................	31	50
On the arc.....................................	31	10

Index error = + 20″.

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APPENDIX No. 5—Continued.

June 21, 1846.—Fort Leavenworth.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	59	03.0	76	36	40	39	21	29
5	01	02.2	76	37	55	39	21	34
5	03	28.6	76	38	55	39	21	22
5	05	13.5	76	40	50	39	21	24
5	06	50.3	76	41	05	39	21	28
5	08	22.5	76	41	45	39	21	23
5	09	50.8	76	42	30	39	21	10
5	11	12.2	76	43	50	39	21	27
5	12	29.6	76	44	35	39	21	36
5	13	55.0	76	45	20	39	21	33
5	15	18.8	76	46	20	39	21	39
5	16	44.7	76	47	10	39	21	36
5	18	15.0	76	48	20	39	21	45
5	19	41.8	76	48	40	39	21	28
5	21	23.5	76	49	50	39	21	32
5	23	06.0	76	51	10	39	21	41

Mean of 16 observations, 39° 21′ 30″.

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APPENDIX No. 5—Continued.

June 21, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, a. m.—June 22.			Double altitudes of sun's upper limb.		Time, p. m.—June 21.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
5	05	42.0	125	50	8	45	51.8	6	53	17.8
5	03	15.8	123	40	8	46	19.8	6	53	18.23
5	02	46.0	123	30	8	46	49.7	6	53	18.33
5	02	17.0	123	20	8	47	17.0	6	53	17.48
	Lost.		123	10	8	47	46.0			
5	01	19.2	123	00	8	48	15.1	6	53	17.58
5	00	51.5	122	50	8	48	43.5	6	53	17.53
5	00	23.5	122	40		Lost.				
4	59	54.5	122	30	8	49	39.7	6	53	17.58
			122	20	8	50	08.5			
			122	10	8	50	36.2			
			122	00	8	51	06.0			

NEW SERIES.

3	47	37.5	95	40	10	01	57.5	6	53	17.96
3	47	11.5	95	30	10	02	24.0	6	53	18.21
3	46	44.2	95	20	10	02	50.2	6	53	17.66
3	46	18.5	95	10	10	03	15.5	6	53	17.46
3	45	52.5	95	00	10	03	41.5	6	53	17.46
3	45	26.8	94	50	10	04	08.3	6	53	18.01
3	45	11.0	94	40	10	04	34.1	6	53	18.01
3	44	34.0	94	30	10	05	00.0	6	53	17.46
3	44	08.5	94	20	10	05	26.2	6	53	17.81
3	41	57.5	93	30	10	07	38.2	6	53	18.31
3	41	32.5	93	20	10	08	03.0	6	53	18.21
3	41	15.3	93	10	10	08	28.0	6	53	17.11
3	40	39.5	93	00	10	08	55.2	6	53	17.81
3	40	14.2	92	50	10	09	21.0	6	53	18.06
	Lost.		92	40	10	09	47.0			
3	39	21.5	92	30	10	10	11.9	6	53	17.06
Ther. 60°					Ther. 75°					

Mean of 22 observations, 6*h*. 53*m*. 17.76*s*.

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APPENDIX No. 5—Continued.

June 22, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
3	48	02.5	95	50	10	01	42.5	6	53	16.69
3	47	37.5	95	40	10	02	08.2	6	53	17.04
3	47	11.5	95	30	10	02	33.5	6	53	16.69
3	46	44.2	95	20	10	02	59.1	6	53	15.84
3	46	18.5	95	10	10	03	26.5	6	53	16.69
3	45	52.5	95	00	10	03	52.0	6	53	16.44
3	45	26.8	94	50	10	04	18.0	6	53	16.59
3	45	01.0	94	40	10	04	45.1	6	53	17.24
3	44	35.0	94	30	10	05	11.0	6	53	17.19
3	44	08.5	94	20	10	05	36.8	6	53	16.84
	Lost.		94	10	10	06	2.3			
	Lost.		94	00	10	06	28.5			
3	41	57.5	93	30	10	07	45.8	6	53	15.84
3	41	32.5	93	20	10	08	11.8	6	53	16.34
3	41	05.3	93	10	10	08	38.8	6	53	16.24
3	40	39.5	93	00	10	09	05.0	6	53	16.44
3	40	14.2	92	50	10	09	30.2	6	53	16.29
Ther. 68°					Ther. 74°					

Mean of 15 observations, 6*h.* 53*m.* 16.52*s.*

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APPENDIX No. 5—Continued.

June 24, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Lyræ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	26	24.0	115	45	10	6	53	06.2
4	27	37.8	116	13	05	6	53	06.0
4	29	38.0	116	58	30	6	53	06.6
4	30	55.7	117	27	55	6	53	06.7
4	32	37.5	118	06	40	6	53	06.3
4	33	58.2	118	37	10	6	53	06.7
4	35	33.7	119	13	45	6	53	05.9
4	37	47.0	120	04	25	6	53	05.9
4	39	30.2	120	44	05	6	53	04.7

Thermometer 66°.

Time, p. m,			Double altitudes of Arcturus in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
4	44	52.0	117	22	50	6	53	11.5	
4	46	47.5	116	44	55	6	53	14.6	rej.
4	48	19.0	116	13	00	6	53	11.8	
4	50	06.8	115	35	35	6	53	09.8	
4	54	31.5	114	04	40	6	53	09.7	
4	55	58.5	113	34	30	6	53	09.8	
4	57	14.2	113	09	10	6	53	14.3	rej.
4	58	38.5	112	38	40	6	53	09.3	
5	00	26.7	112	01	45	6	53	12.0	
5	02	05.0	111	27	25	6	53	12.2	

Barometer 39.52 Thermometer 64°.
34.57

	h.	*m.*	*s.*
Chronometer fast by 9 obs. of east star	6	53	06.58
Chronometer fast by 8 obs. of west star			10.76
Mean	6	53	08.67

APPENDIX No. 5—Continued.

June 25, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of sun's upper limb.		Time, a. m.—June 26.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
10	08	34.5	93	20	3	42	24.5	6	53	07.09
10	09	00.0	93	10	3	41	59.5	6	53	07.35
10	10	44.2	92	30	3	40	15.0	6	53	07.31
10	11	10.2	92	20	3	39	48.5	6	53	06.71
10	11	36.5	92	10						
10	12	02.8	92	00	3	38	58.0	6	53	08.02
10	14	38.0	91	00	3	36	20.5	6	53	06.88
10	17	14.2	90	00	3	33	44.0	6	53	06.73
10	17	40.0	89	50						
Ther. 78°					Ther. 74°					

Barometer, 39.50.
34.48.

Mean of 7 observations, 6*h.* 53*m.* 07.16*s.*

June 26, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
3	38	58.0	92	00	10	12	07.0	6	53	05.97
Lost.			92	10	10	11	41.2			
3	39	48.1	92	20	10	11	14.2	6	53	04.57
3	40	15.0	92	30	10	10	48.2	6	53	05.07
3	40	40.8	92	40	10	10	22.5	6	53	05.12
3	41	09.2	92	50	10	09	57.5	6	53	06.32
3	41	33.0	93	00	10	09	30.2	6	53	05.07
3	41	59.5	93	10	10	09	04.2	6	53	05.31
3	42	24.5	93	20	10	08	40.3	6	53	05.86
3	42	50.8	93	30	10	08	10.8	6	53	05.76
3	43	16.5	93	40	Lost.					
3	44	42.0	93	50	10	07	21.2	6	53	05.06
3	45	10.2	94	00	10	06	54.5	6	53	05.81
Ther. 74°					Ther. 80°					

Mean of 11 observations, 6*h.* 53*m.* 05.45*s.*

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APPENDIX No. 5—Continued.

June 26, 1846.—*Fort Leavenworth, N. W. angle of square.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of α Ophiuchi, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	29	57.5	94	36	40	39	21	12
4	31	35.8	94	39	20	39	21	00
4	33	00.0	94	40	30	39	21	12
4	34	14.0	94	41	50	39	21	07
4	35	47.9	94	42	50	39	21	11
4	37	20.0	94	43	40	39	21	08
4	38	51.2	94	44	10	39	21	06
4	40	19.7	94	44	15	39	21	05
4	42	05.0	94	43	25	39	21	20
4	43	35.5	94	42	30	39	21	27
4	45	03.8	94	41	50	39	21	18
4	46	19.0	94	40	40	39	21	18
4	48	10.0	94	38	25	39	21	27
4	49	25.2	94	37	10	39	21	15
4	50	39.8	94	34	30	39	21	38
4	52	01.2	94	32	15	39	21	35
4	53	35.8	94	29	10	39	21	37

Thermometer 64°.

Mean of 17 observations, 39° 21′ 17″.

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APPENDIX No. 5—Continued.

June 26, 1846.—Fort Leavenworth.

DETERMINATION OF LATITUDE.

Time. p. m.			Double altitude of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	58	46.5	76	47	45	39	21	21
5	00	03.2	76	48	40	39	21	24
5	01	37.2	76	49	50	39	21	30
5	02	50.8	76	50	20	39	21	23
5	03	59.0	76	51	20	39	21	31
5	05	07.2	76	52	10	39	21	35
5	06	12.1	76	53	05	39	21	42
5	07	55.2	76	53	40	39	21	29
5	09	20.0	76	54	50	39	21	38
5	10	27.1	76	55	35	39	21	39
5	11	19.8	76	56	05	39	21	37

Barometer, 39.42 inches.
" 34.41 "

Thermometer 64°.

Mean of 11 observations, 39° 21′ 32″.

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APPENDIX No. 5—Continued.

[Without using horizon glass.]

June 26, 1846.—Fort Leavenworth.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Ophiuchi, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	49	39.8	126	23	20	39	20	01
5	51	37.8	126	28	40	39	20	00
5	52	20.2	126	32	55	39	20	19
5	54	26.0	126	35	05	39	20	00
5	56	40.7	126	38	20	39	20	48
5	58	38.6	126	38	40	39	21	06
6	00	57.0	126	40	50	39	20	44
6	02	39.2	126	39	55	39	21	05
6	04	05.4	126	38	15	39	21	36
6	06	34.0	126	36	45	39	21	16
6	07	55.1	126	34	20	39	21	55
6	09	18.7	126	33	05	39	21	15
6	10	21.2	126	29	50	39	19	45
6	11	43.5	126	27	20	39	19	32
6	13	23.2	126	23	45	39	20	16

Thermometer 63 .

Barometer, 39.42.
34.41.

Mean of 15 observations, 39° 20′ 37″.

	Latitude of Fort.		
	Deg.	*m.*	*s.*
Latitude by 16 observations of Polaris, June 21..	39	21	30
" 11 " Polaris, June 26..		21	32
" 17 " *a* Ophiuchi, June 26		21	17
" 15 " *a* Ophiuchi, June 26		20	37
Mean..................	39	21	14

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APPENDIX No. 5—Continued.

June 26, 1846.—*Fort Leavenworth.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of —— in the east.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
6	21	08.0	117	18	45
6	22	49.0	117	55	10
6	25	23.5	118	42	15
6	27	06.0	119	25	50
6	28	20.0	119	52	10
6	31	13.2	120	53	50
6	32	11.0	121	13	00
6	33	17.5	121	38	25
6	34	41.0	122	08	05

Barometer, 39.42.
34.41.

Thermometer 60°.

So much noise from the barracks, that I have no confidence in these observations.

APPENDIX No. 5—Continued.

June 27, 1846.—Fort Leavenworth.

DETERMINATION OF TIME.

Time, a. m.—June 21.			Double altitudes of sun's upper limb.		Time, p. m.—June 26.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*	
3	39	19.0	92	00	10	12	07.0	6	52	06.09	
3	39	40.0	92	10	10	11	41.2	6	52	06.63	
3	40	04.8	92	20	10	11	14.2	6	52	05.63	
3	40	32.0	92	30	10	10	48.2	6	52	06.13	
3	40	57.2	92	40	10	10	22.5	6	52	05.88	
3	41	22.8	92	50	10	09	57.5	6	52	06.18	
3	41	47.7	93	00	10	09	30.2	6	52	04.98	rej.
3	42	16.0	93	10	10	09	04.2	6	52	06.15	
3	42	41.0	93	20	10	08	40.3	6	52	06.68	
3	43	07.8	93	30	10	08	13.8	6	52	06.83	
3	43	32.6	93	40		lost.					
3	44	00.0	93	50	10	07	21.2	6	52	06.63	
3	44	24.8	94	00	10	06	54.5	6	52	05.68	

Mean of 11 observations, 6*h.* 52*m.* 06.22*s.*

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APPENDIX No. 5—Continued.

June 30, 1846.—*Camp No.* 4.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitude of α Serpentis, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	49	20.8	115	59	10	38	53	54
3	50	36.8	116	00	10	38	54	05
3	51	41.7	116	01	15	38	53	59
3	52	52.0	116	02	05	38	53	58
3	54	01.0	116	02	45	38	53	53
3	55	32.7	116	02	55	38	53	54
3	56	55.8	116	02	45	38	53	55
3	58	04.5	116	01	40	38	54	15
3	59	4.8	116	01	25	38	53	50
4	00	46.0	116	00	00	38	54	07
4	02	3.1	115	58	31	38	54	10
4	03	20.0	115	56	50	38	54	08
4	04	33.0	115	53	40	33	53	45

The four last observations rather doubtful; musquitos so very troublesome.

Mean of 13 observations, 38° 53′ 59″.

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APPENDIX No. 5—Continued.

June 30, 1846.—*Camp No.* 4.

DETERMINATION OF LATITUDE.

Time. p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	13	42.0	75	35	50	38	54	00
4	15	19.8	75	37	30	38	54	23
4	16	36.0	75	38	30	38	54	33
4	17	58.2	75	39	05	38	54	27
4	19	27.7	75	39	50	38	54	27
4	20	50.0	75	40	00	38	54	09
4	22	2.8	75	40	40	38	54	08
4	23	0.0	75	41	25	38	54	13
4	24	34.2	75	42	20	38	54	16
4	26	28.5	75	43	15	38	54	14
4	27	48.7	75	43	55	38	54	10

Thermometer, 67°.

	Deg.	*min.*	*sec.*	
Latitude by 13 observations of Polaris,	38	54	18	
Latitude by 13 observations of *a* Serpentis,		53	59	
Mean	38	54	08	lat. of camp.

APPENDIX No. 5—Continued.

June 30, 1846.—*Camp* 4.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Lyræ in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	30	19.1	102	54	10	6	54	05.5	
3	32	16.0	103	37	55	6	54	05.3	
3	33	51.0	104	13	30	6	54	00.3	rej.
3	34	54.2	104	38	05	6	54	03.3	
3	36	21.5	105	09	55	6	54	06.0	
3	37	29.8	105	35	50	6	54	05.0	
3	38	49.0	106	05	15	6	54	06.4	

Thermometer, 68°.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
4	33	00.0	114	07	30	6	54	12.9	
4	34	16.0	113	40	40	6	54	12.7	
4	35	28.7	113	15	00	6	54	12.3	
4	36	44.0	112	48	30	6	54	12.4	
4	37	49.0	112	24	55	6	54	11.0	
4	39	03.5	111	59	20	6	54	13.4	
4	40	18.7	111	32	30	6	54	16.1	rej.
4	41	47.0	111	01	10	6	54	14.0	
4	42	38.2	110	42	20	6	54	12.5	
4	44	34.0	110	00	00	6	54	10.2	
4	45	48.5	109	33	50	6	54	12.1	

Thermometer, 66°.

	h.	*m.*	*s.*
Chronometer fast by 6 obs. of east star	6	54	05.30
Chronometer fast by 10 obs. of west star			12.55
Mean	6	54	8.82

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APPENDIX No. 5—Continued.

July 4, 1846.—*Camp* 8, *Big John Spring.*

DETERMINATION OF TIME.

Time, p. m.			Double altitude of sun's upper limb.		Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
10	33	24.2	86	10	6	58	49.7
10	33	50.8	86	00	6	58	50.6
10	34	17.0	85	50	6	58	51.0
10	34	41.8	85	40	6	58	50.3
10	35	08.2	85	30	6	58	51.1
10	35	33.7	85	20	6	58	50.9
10	35	59.0	85	10	6	58	50.6
10	36	25.8	85	00	6	58	51.7
10	36	49.2	84	50	6	58	49.4
10	37	17.0	84	40	6	58	51.6
10	37	42.0	84	30	6	58	51.0
10	38	08.5	84	20	6	58	51.8
10	38	35.2	84	10	6	58	52.9
10	38	58.7	84	00	6	58	50.7

Thermometer, 88°.

Mean of 14 observations, 6*h*. 58*m*. 50.96*s*.

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APPENDIX No. 5—Continued.

July 5, 1846.—*Camp* 8, *Big John Spring.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of *a* Aquilæ in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
10	31	28.0	85	48	40	6	58	47.9	
10	32	30.8	85	28	30	6	58	50.8	
10	33	37.0	85	04	20	6	58	46.6	
10	34	57.9	84	36	05	6	58	47.4	
10	36	25.8	84	06	35	6	58	47.9	
10	38	06.2	83	31	25	6	58	46.8	
10	39	10.0	83	09	35	6	58	47.9	
10	40	09.7	82	48	30	6	58	47.0	
10	41	04.5	82	28	40	6	58	44.9	rej.
10	42	03.2	82	08	30	6	58	46.0	

Mean of 9 observations, 6*h.* 58*m.* 47.59*s.*

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APPENDIX No. 5—Continued.

July 5, 1846.—*Camp* 8, *Big John Spring*.

DETERMINATION OF LATITUDE.

Time, a. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
10	03	11.0	79	24	45	38	39	50
10	04	43.8	79	25	50	38	39	55
10	06	16.7	79	26	25	38	39	44
10	07	31.0	79	27	20	38	39	52
10	09	20.0	79	28	20	38	39	53
10	11	54.0	79	29	50	38	39	54

Time, a. m.			Double altitude of Saturn, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
10	16	59.0	77	13	20	38	38	43
10	18	39.9	77	12	55	38	38	59
10	19	46.2	77	12	15	38	39	16
10	21	37.3	77	11	55	38	39	10
10	22	52.0	77	11	30	38	39	05
10	24	01.8	77	10	35	38	39	11
10	25	29.2	77	09	00	38	39	10
10	26	49.0	77	08	05	38	39	11

Thermometer 75°.

	Latitude of camp.		
	Deg.	*min.*	*sec.*
Latitude by 6 observations of Polaris...........	38	39	51
" 8 " " Saturn			06
Mean	38	39	28

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APPENDIX No. 5—Continued.

July 5, 1846.—*Camp* 9, *Diamond Spring*.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	53	40.0	74	58	35	38	36	52
3	55	03.2	74	59	10	38	36	48
3	56	33.0	75	00	15	38	36	58
3	58	06.5	75	00	55	38	36	54
3	59	11.0	75	01	40	38	36	58
4	00	05.0	75	02	00	38	36	54
4	01	07.0	75	02	35	38	36	56
4	01	59.0	75	03	00	38	36	54
4	03	13.5	75	03	35	38	36	53
4	04	35.7	75	04	35	38	36	57
4	10	58.0	75	07	25	38	36	57
4	12	00.0	75	08	20	38	36	49
4	13	07.2	75	09	25	38	36	49
4	14	56.0	75	09	55	38	36	50
4	15	56.2	75	10	40	38	36	51

Thermometer 72°.

Mean of 16 observations, 38° 36′ 52″.

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APPENDIX No. 5—Continued.

July 5, 1846.—*Camp* 9, *Diamond Spring*.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Lyræ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	26	57.2	106	40	45	6	59	54.8
3	28	49.8	107	21	55	6	59	58.4
3	29	55.7	107	47	20	6	59	57.0
3	30	45.0	108	07	25	6	59	53.2
3	32	32.0	108	47	10	6	59	54.9
3	33	39.7	109	11	55	6	59	57.2
3	34	38.2	109	32	50	6	59	60.4
3	35	34.0	109	55	40	6	59	56.0
3	36	31.5	110	17	40	6	59	55.4
3	37	24.7	110	37	40	6	59	55.8
3	38	47.5	111	9	00	6	59	55.9

Thermometer 72°.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	20	57.0	113	44	20	6	59	60.8
4	22	02.0	113	21	15	6	59	60.9
4	23	07.8	112	52	35	6	59	60.2
4	24	16.0	112	33	15	6	59	60.2
4	25	20.8	112	10	00	6	59	60.0
4	26	09.7	111	52	35	6	59	60.4
4	27	10.7	111	30	25	6	59	59.5
4	28	11.0	111	08	30	6	59	58.9
4	29	33.8	110	38	55	6	59	59.8

Thermometer 71°.

	h.	*m.*	*s.*
Chronometer fast by 11 observations of east star	6	59	56.27
" " 9 " west star			60.08
Mean....................	6	59	58.18

APPENDIX No. 5—Continued.

July 6, 1846.—*Camp* 10, *Cottonwood Grove.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Lyræ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	05	32.8	122	05	00	7	01	54.0
4	06	40.0	122	31	55	7	01	57.0
4	07	59.5	123	01	10	7	01	54.3
4	09	07.0	123	27	55	7	01	52.0
4	10	21.8	123	56	55	7	01	51.1
4	11	45.8	124	28	15	7	01	53.7
4	13	04.5	124	59	20	7	01	51.5
4	14	24.0	125	29	50	7	01	51.7

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	19	30.0	113	37	55	7	01	56.5
4	20	52.8	113	07	50	7	01	54.9
4	22	43.2	112	28	15	7	01	54.8
4	24	04.3	111	59	15	7	01	55.2
4	25	25.2	111	30	35	7	01	56.6
4	27	26.5	110	45	50	7	01	54.1
4	29	40.0	109	57	55	7	01	55.8
4	32	42.8	108	51	10	7	01	55.5
4	34	54.0	108	13	40	7	01	57.1
4	35	46.2	107	44	15	7	01	56.6
4	38	05.8	106	52	55	7	01	55.8
4	39	14.0	106	26	55	7	01	54.6

Thermometer 72°.

	h.	*m.*	*s.*
Chronometer fast by 8 observations of east star	7	01	52.44
" " 12 " west star			55.62
Mean....................	7	01	54.03

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APPENDIX No. 5—Continued.

July 6, 1846.—Camp 10, Cottonwood Grove.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	49	21.0	75	17	45	38	29	44
4	53	05.0	75	19	35	38	29	25
4	54	07.0	75	20	35	38	29	35
4	55	36.2	75	21	35	38	29	35
4	56	58.3	75	22	10	38	29	25
4	58	07.0	75	22	35	38	29	12
4	59	31.0	75	23	50	38	29	26
5	01	14.7	75	25	20	38	29	35
5	02	28.7	75	26	10	38	29	38
5	03	46.0	75	27	05	38	29	37

Thermometer, 71°.

July 7, 1846.—Camp 10.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	16	45.0	74	59	45	38	29	31
4	19	27.5	75	01	05	38	29	22
4	20	16.0	75	01	40	38	29	27

Thermometer 68°.

	Deg.	*min.*	*sec.*
Latitude by 10 obs. of Polaris, July 6............	38	29	31
Latitude by 3 obs. of Polaris, July 7.............			27
Mean of 13 observations	38	29	30

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APPENDIX No. 5—Continued.

July 7, 1846.—*Camp* 10, *Cottonwood Grove.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
4	01	24.2	95	50	7	01	50.3
4	01	50.4	96	00	7	01	50.7
4	02	16.3	96	10	7	01	50.8
4	02	41.8	96	20	7	01	50.4
4	03	07.0	96	30	7	01	49.8
4	03	58.8	96	50	7	01	49.9
4	04	50.8	97	10	7	01	50.3
4	05	17.0	97	20	7	01	50.5
4	05	42.7	97	30	7	01	50.4
4	06	08.7	97	40	7	01	50.5
4	06	34.0	97	50	7	01	49.9
4	06	59.6	98	00	7	01	49.6

Thermometer, 88°.

Mean of 12 observations, 7*h.* 04*m.* 50.26*s.*

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APPENDIX No. 5—Continued.

July 7, 1846.—*Camp* 10, *Cottonwood Grove.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of sun's upper limb.		Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
10	17	49.0	93	20	7	01	54.0
10	18	14.5	93	10	7	01	53.6
10	18	38.8	93	00	7	01	52.4
10	19	05.1	92	50	7	01	52.8
10	19	31.0	92	40	7	01	53.1
10	19	57.0	92	30	7	04	53.4
10	20	47.5	92	10	7	01	52.4
10	21	13.5	92	00	7	01	52.7
10	21	39.2	91	50	7	01	52.7
10	22	08.0	91	40	7	01	52.8
10	22	30.0	91	30	7	01	52.1
10	22	56.5	91	20	7	01	52 9
10	23	21.8	91	10	7	01	52.5
10	23	48.0	91	00	7	01	53.0

Thermometer, 90°.

Mean of 14 observations, 7*h.* 01*m.* 53.10*s.*

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	04	16.8	117	33	55	7	01	50.4
4	05	24.5	117	11	5	7	01	52.4
4	06	46.0	116	42	20	7	01	51.2
4	07	32.0	116	26	40	7	01	52.5
4	09	54.0	115	36	55	7	01	52.7

Mean of 5 observations, 7*h.* 01*m.* 51.84*s.*

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APPENDIX No. 5—Continued.

July 11, 1846.—*Camp* 14, *Bend of Arkansas.*

Time, p. m.			Double altitudes of *a* Lyræ in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	26	08.0	112	31	05	7	07	01.8	
3	27	04.0	112	52	20	7	07	02.0	
3	28	05.8	113	15	10	7	07	03.8	
3	29	04.7	113	38	10	7	07	02.3	
3	30	34.0	114	13	10	7	06	59.7	rej.
3	31	35.2	114	35	05	7	07	03.4	
3	32	41.0	114	59	50	7	07	04.2	
3	34	12.0	115	35	10	7	07	02.8	
3	35	03.2	115	54	40	7	07	02.9	
3	36	01.2	116	16	40	7	07	03.2	
3	37	02.0	116	40	15	7	07	02.1	
3	38	06.2	117	05	10	7	06	59.4	rej.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	41	09.1	121	59	55	7	07	05.0
3	42	10.7	121	39	20	7	07	04.8
3	43	37.5	121	10	25	7	07	05.5
3	44	41.8	120	48	40	7	07	05.4
3	45	38.0	120	29	30	7	07	04.9
3	47	01.0	120	01	25	7	07	05.2
3	47	58.8	119	41	15	7	07	04.0
3	49	01.8	119	19	40	7	07	02.9
3	50	05.5	118	57	30	7	07	03.0
3	51	02.2	118	38	10	7	07	03.7
3	52	00.3	118	18	10	7	07	03.9
3	53	01.5	117	57	15	7	07	04.7

Thermometer, 71°.

	h.	*m.*	*s.*
Chronometer fast by 10 obs. of east star..........	7	07	02.85
Chronometer fast by 12 obs. of west star			04.42
Mean	7	07	03.64

APPENDIX No. 5—Continued.

July 11, 1846.—*Camp* 14, *Bend of Arkansas.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	16	18.0	74	48	40	38	21	02
4	17	27.8	74	49	55	38	21	19
4	18	52.5	74	50	30	38	21	09
4	20	33.0	74	51	25	38	21	05
4	21	26.1	74	52	10	38	21	11
4	22	30.5	74	52	40	38	21	07
4	23	55.5	74	53	30	38	21	05
4	24	56.2	74	54	40	38	21	21
4	25	45.0	74	55	10	38	21	21
4	26	24.2	74	55	40	38	21	24
4	27	35.1	74	56	00	38	21	12
4	28	53.0	74	57	20	38	21	27
4	30	07.5	74	57	55	38	21	21
4	31	24.2	74	59	05	38	21	31
4	33	57.0	74	59	55	38	21	10
4	34	52.2	75	01	05	38	21	25
4	36	20.5	75	01	50	38	21	19
4	37	01.0	75	02	20	38	21	24
4	37	45.1	75	02	45	38	21	19
4	39	00.0	75	03	20	38	21	10

Thermometer 71°.

Mean of 20 observations, 38° 21′ 16″.

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APPENDIX No. 5—Continued.

July 11, 1846.—*Camp* 14, *Bend of Arkansas.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of α Ophiuchi, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	44	10.7	126	45	25	38	20	48
4	46	13.1	126	58	40	38	20	27
4	48	04.5	127	11	00	39	20	32
4	50	14.7	127	23	20	38	21	02
4	51	54.8	127	33	00	38	21	01
4	53	50.8	127	43	10	38	21	06
4	56	01.0	127	53	40	38	21	08
5	00	44.0	128	12	30	38	21	21
5	02	12.8	128	17	25	38	21	34
5	03	58.2	128	23	15	38	21	16
5	05	13.0	128	26	50	38	20	58
5	06	41.5	128	30	00	38	21	06
5	08	21.7	128	33	25	38	21	03
5	09	29.5	128	35	40	38	20	51
5	10	39.6	128	37	10	38	20	54
5	12	17.0	128	38	10	38	21	12
5	13	17.5	128	38	55	38	21	16
5	14	45.0	128	39	45	38	21	15
5	16	07.0	128	39	20	38	21	21
5	18	10.2	128	38	55	38	21	27
5	19	15.7	128	37	40	38	21	46
5	20	21.0	128	36	30	38	20	52
5	21	17.0	128	35	50	38	20	42
5	22	40.2	128	33	10	38	21	05
5	24	12.1	128	31	45	38	21	29
5	25	24.5	128	28	50	38	21	44
5	26	29.7	128	27	00	38	21	24
5	27	34.6	128	24	40	38	21	12

Thermometer 71°.

	Latitude of camp.		
	Deg.	*min.*	*sec.*
Latitude by 28 observations of α Ophiuchi......	38	21	18
" 20 " Polaris.........			16
Mean.....................	38	21	17

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APPENDIX No. 5—Continued.

July 13, 1846.—*Camp* 16, *Pawnee Fork.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Lyræ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	26	32.1	114	44	50	7	09	12.9
3	27	51.3	115	15	40	7	09	11.5
3	28	56.2	115	40	15	7	09	11.9
3	29	54.0	116	02	05	7	09	12.7
3	31	22.0	116	36	15	7	09	10.3
3	32	41.7	117	05	50	7	09	13.8
3	33	54.9	117	34	20	7	09	12.6
3	34	55.6	117	57	30	7	09	12.7
3	36	00.0	118	22	45	7	09	11.2

Thermometer 72°.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	44	26.2	119	06	55	7	09	12.1
3	45	39.5	118	41	15	7	09	11.5
3	46	44.0	118	19	20	7	09	12.9
3	47	55.7	117	54	15	7	09	12.8
3	49	09.0	117	28	10	7	09	11.5
3	50	19.7	117	14	00	7	09	13.4
3	52	44.9	116	12	50	7	09	13.4
3	54	24.0	115	37	45	7	09	13.5
3	55	40.9	115	10	20	7	09	13.4

Thermometer 71°.

	h.	*m.*	*s.*
Chronometer fast by 9 observations of east star	7	09	12.18
" 9 " west star			12.74
Mean....................	7	09	12.46

APPENDIX No. 5—Continued.

July 13, 1846.—*Camp* 16, *Pawnee Fork.*

Time.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	24	21.0	74	35	30	38	10	10
4	25	35.9	74	36	10	38	10	06
4	26	38.4	74	36	50	38	10	06
4	27	25.8	74	37	20	38	10	04
4	28	35.2	74	38	5	38	10	06
4	29	20.8	74	38	40	38	10	09
4	30	14.6	74	39	15	38	10	09
4	31	16.0	74	39	50	38	10	08
4	32	06.0	74	40	30	38	10	13
4	32	43.0	74	41	00	38	10	13
4	34	06.8	74	41	55	38	10	17
4	34	54.2	74	42	40	38	10	20
4	35	35.0	74	43	15	38	10	24

Thermometer 70°.

July 14, 1846.—*Camp* 16, *Pawnee Fork.*

Time.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	39	43.5	74	47	55	38	10	05
4	41	00.0	74	48	55	38	10	07
4	42	05.8	74	49	50	38	10	11
4	43	12.2	74	50	30	38	10	08
4	43	56.5	74	51	30	38	10	23

	Latitude of camp.		
	Deg.	*min.*	*sec.*
Latitude, by 5 observations, July 14............	38	10	10
" 13 " July 13............			16
Mean	38	10	11

APPENDIX No. 5—Continued.

July 14, 1846.—*Camp* 16, *Pawnee Fork.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	32	15.8	118	28	15	7	09	08.5	
3	33	39.4	119	00	25	7	09	08.5	
3	34	34.0	119	21	50	7	09	07.0	
3	35	33.0	119	44	25	7	09	07.1	
3	36	28.8	120	04	20	7	09	11.0	rej.
3	37	37.0	120	32	40	7	09	05.4	rej.
3	38	49.3	120	59	28	7	09	08 0	
3	39	47.0	121	21	20	7	09	08.6	
3	41	07.2	121	52	05	7	09	08.8	

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
4	20	02.3	104	47	45	7	09	11.8	
4	21	03.8	104	23	55	7	09	09.8	
4	21	50.8	104	06	20	7	09	09.9	
4	22	31.6	103	50	55	7	09	09.7	
4	23	41.0	103	25	30	7	09	11.5	
4	24	55.0	102	57	15	7	09	07.6	rej.
4	25	58.7	102	33	30	7	09	11.2	
4	26	57.5	102	11	50	7	09	11.1	
4	28	05.0	101	45	20	7	09	10.1	

Thermometer 71°.

	h.	*m.*	*s.*
Chronometer fast by 7 obs. of east star...........	7	09	08.04
Chronometer fast by 8 obs. of west star			10.84
Mean	7	09	09.44

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APPENDIX No. 5—Continued.

July 19, 1846.—*Camp* 20, *Jackson Grove.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	26	44.5	118	20	50	7	11	38.9	
3	28	02.5	117	52	50	7	11	36.1	
3	29	15.2	117	27	35	7	11	38.8	
3	30	13.8	117	06	15	7	11	38.0	
3	31	24.0	116	41	15	7	11	38.7	
3	32	16.5	116	23	30	7	11	41.7	
3	33	11.0	116	03	30	7	11	40.5	
3	34	05.0	115	43	35	7	11	33.6	rej.
3	35	05.7	115	22	10	7	11	40.5	
3	35	55.5	115	03	45	7	11	39.2	
3	36	43.0	114	46	25	7	11	38.8	
3	37	41.0	114	25	50	7	11	40.2	

Thermometer 72°.

Time, p. m.			Double altitudes of *a* Lyræ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	13	28.8	117	37	30	7	11	38.2
3	14	37.0	118	13	10	7	11	39.6
3	15	26.0	118	22	10	7	11	36.3
3	16	30.8	118	37	40	7	11	37.5
3	17	45.0	119	15	40	7	11	39.0
3	18	44.9	119	38	55	7	11	38.4
3	19	54.5	120	06	00	7	11	37.7
3	21	00.0	120	30	20	7	11	38.1

Thermometer 72°.

	h.	*min.*	*sec.*
Chronometer fast by 11 obs. of west star	7	11	39.22
Chronometer fast by 8 obs. of east star			38.35
Mean	7	11	38.78

APPENDIX No. 5—Continued.

July 19, 1846.—*Camp* 20, *Jackson Grove.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	43	52.0	73	26	30	37	41	53
3	45	01.3	73	27	10	37	41	52
3	46	12.5	73	27	55	37	41	35
3	47	05.5	73	29	00	37	41	51
3	48	06.3	73	29	40	37	41	56
3	49	00.0	73	30	00	37	41	46
3	50	04.0	73	30	30	37	41	41
3	50	43.8	73	31	00	37	41	45
3	52	01.0	73	31	35	37	41	39
3	53	05.0	73	32	00	37	41	33
3	54	00.0	73	32	40	37	41	33
3	56	12.8	73	33	40	37	41	23
3	56	52.5	73	34	20	37	41	30
3	57	31.7	73	35	00	37	41	38
3	58	16.8	73	35	40	37	41	44

Thermometer 72°.

Mean of 15 observations, 57° 41′ 41″.

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APPENDIX No. 5—Continued.

July 19, 1846.—*Camp* 20, *Jackson Grove.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Herculis, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	18	25.5	133	31	35	37	41	41
4	20	04.8	133	35	50	37	41	56
4	22	52.5	133	41	40	37	41	26
4	24	15.8	133	44	00	37	41	15
4	25	46.6	133	45	45	37	41	10
4	27	38.5	133	46	30	37	41	21
4	28	59.7	133	46	30	37	41	29
4	30	10.0	133	46	20	37	41	29
4	31	23.9	133	45	40	37	41	33
4	32	12.2	133	45	00	37	41	36
4	33	19.7	133	43	40	37	41	45
4	35	13.0	133	41	15	37	41	46
4	36	10.5	133	39	20	37	41	51
4	37	06.0	133	38	20	37	41	28
4	38	18.4	133	34	40	37	41	58

	Deg.	*min.*	*sec.*	
Latitude by 15 obs. of Polaris.........	37	41	41	
Latitude by 15 obs. of *a* Herculis......			35	
Mean	37	41	38	lat. of camp.

APPENDIX No. 5—Continued.

July 19, 1846.—*Camp* 20, *Jackson Grove, Arkansas.*

DETERMINATION OF TIME.

Time.			Double altitude of the sun's upper limb.		Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
10	34	23.6	89	30	7	11	38.2
10	34	50.2	89	20	7	11	39.3
10	35	15.8	89	10	7	11	39.4
10	35	42.0	89	00	7	11	40.1
10	36	07.0	88	50	7	11	39.7
10	36	32.3	88	40	7	11	39.5
10	36	57.0	88	30	7	11	39.7
10	37	23.8	88	20	7	11	40.1
10	37	48.0	88	10	7	11	38.7
10	38	14.2	88	00	7	11	39.4
10	38	39.7	87	50	7	11	39.5
10	39	04.8	87	40	7	11	39.2
10	39	30.3	87	30	7	11	39.3
10	39	54.7	87	20	7	11	38.3
10	40	21.8	87	10	7	11	39.8
10	40	47.8	87	00	7	11	40.5

Thermometer 88°.

Mean of 16 observations, 7*h.* 11*m.* 39.36*s.*

DETERMINATION OF INDEX ERROR.

	Min.	*sec.*
On the arc..............................	31	20
Off the arc..............................	31	40

Index error = + 10″.

APPENDIX No. 5—Continued.

July 22, 1846.—Camp 23, Arkansas river.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Aquilæ.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	27	17.2	90	30	10	7	15	38.9
4	28	39.6	90	57	40	7	15	39.1
4	29	36.5	91	17	30	7	15	37.2
4	30	35.3	91	37	10	7	15	37.3
4	31	32 2	91	54	15	7	15	43.0 rej.
4	32	34.8	92	15	55	7	15	40.3
4	33	46.7	92	40	20	7	15	38.7

Thermometer 68°.

Time, p. m.			Double altitudes of Arcturus, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	37	33.7	88	34	30	7	15	39.3
4	38	20.0	88	16	20	7	15	39.1
4	39	17.5	87	54	20	7	15	40.3
4	40	43.8	87	20	40	7	15	40.5
4	41	30.7	87	01	50	7	15	39.1
4	42	19.1	86	43	10	7	15	39.8
4	43	30.8	86	15	50	7	15	41.7

Thermometer 68°.

	h.	*m.*	*s.*
Chronometer fast by 6 observations east star....	7	15	38.58
Chronometer fast by 7 observations west star ...			39.97
Mean....................	7	15	39.28

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APPENDIX No. 5—Continued.

July 22, 1846.—*Camp* 23.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	49	32.5	74	47	10	37	57	20
4	50	37.0	74	48	10	37	57	33
4	51	26.8	74	48	50	37	57	34
4	52	01.8	74	49	20	37	57	37
4	52	46.0	74	49	55	37	57	40
4	53	37.3	74	50	44	37	57	42
4	54	34.9	74	51	20	37	57	41
4	55	16.8	74	52	00	37	57	45
4	56	34.0	74	52	45	37	57	39
4	57	16.0	74	53	15	37	57	40
4	57	57.5	74	54	00	37	57	47

Thermometer 68°.

Mean of 11 observations, 37° 57′ 39″.

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APPENDIX No. 5—Continued.

July 25, 1846.—*Camp* 26, *Arkansas river.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	37	02.7	74	10	30	38	01	01
3	38	16.5	74	11	10	38	00	58
3	39	16.5	74	11	50	38	00	56
3	39	51.5	74	12	30	38	01	07
3	40	35.0	74	13	10	38	01	14
3	42	17.2	74	13	50	38	01	04
3	43	08.2	74	14	50	38	01	18
3	44	20.8	74	15	15	38	01	07
3	45	08.5	74	15	40	38	01	05
3	45	52.0	74	16	20	38	01	11
3	46	27.5	74	16	55	38	01	17
3	47	14.8	74	17	10	38	01	10
3	47	55.2	74	17	30	38	01	07
3	48	06.1	74	17	55	38	01	08
3	50	27.8	74	19	30	38	01	18

Thermometer 78°.

Mean of 15 observations, 38° 01′ 08″.

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APPENDIX No. 5—Continued.

July 25, 1846.—Camp 26, on the Arkansas.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	54	48.2	102	04	05	7	19	46.2
3	56	33.8	101	24	50	7	19	48.5
3	58	09.7	100	47	50	7	19	47.0
3	59	13.7	100	23	25	7	19	46.9
4	00	17.8	99	59	20	7	19	47.9
4	01	28.6	99	31	40	7	19	46.4
4	02	27.7	99	08	55	7	19	45.8
4	03	30.0	98	45	40	7	19	47.4
4	04	33.5	98	20	20	7	19	44.8 rej.

Thermometer 77°.

Time, p. m.			Double altitudes of *a* Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	11	05.8	87	32	30	7	19	46.9
4	12	20.7	87	58	20	7	19	46.7
4	13	14.5	88	16	20	7	19	48.0
4	14	46.7	88	47	55	7	19	47.8
4	15	43.0	89	06	20	7	19	50.0
4	16	34.6	89	24	40	7	19	48.7
4	17	32.5	89	44	50	7	19	46.2
4	18	34.0	90	04	50	7	19	48.4
4	19	47.8	90	30	10	7	19	47.0
4	20	32.2	90	53	15	7	19	52.5 rej.

Thermometer 77°.

	h.	*min.*	*sec.*
Chronometer fast by 8 obs. of west star	7	19	47.01
Chronometer fast by 9 obs. of west star			47.78
Mean	7	19	47.40

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APPENDIX No. 5—Continued.

July 29, 1846—Camp 30, near Bent's Fort.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	20	28.0	88	19	10	7	25	31.6
4	21	57.7	87	44	30	7	25	32.4
4	22	59.0	87	20	25	7	25	31.9
4	24	62.0	86	56	00	7	25	32.4
4	25	09.8	86	29	30	7	25	32.4
4	25	57.5	86	10	50	7	25	32.3
4	26	59.2	85	46	43	7	25	32.3
4	28	04.7	85	20	05	7	25	29.7
4	28	56.5	84	59	40	7	25	29.4
4	30	01.0	84	35	10	7	25	31.2
4	31	01.5	84	11	50	7	25	32.2

Time, p. m.			Double altitudes of α Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	34	06.8	98	20	30	7	25	32.3
4	35	39.8	98	48	50	7	25	33.6
4	36	50.1	99	10	20	7	25	33.8
4	37	48.6	99	28	30	7	25	33.9
4	39	17.0	99	55	30	7	25	33.2
4	40	44.0	100	21	20	7	25	35.0
4	41	58.0	100	44	20	7	25	32.6
4	43	28.8	101	12	10	7	25	30.0
4	44	24.5	101	26	55	7	25	35.9
4	45	35.0	101	48	40	7	25	32.6
4	46	57.7	102	13	20	7	25	31.4

Thermometer 66°

	h.	*m.*	*s.*
Chronometer fast by 11 observations of west star..	7	25	31.62
" 12 " east star...			32.12
Mean	7	25	32.37

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APPENDIX No. 5—Continued.

July 30, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	33	05.8	104	59	30	7	25	32.1
3	34	37.0	104	24	50	7	25	30.1
3	35	32.5	104	01	05	7	25	31.6
3	37	00.8	103	30	55	7	25	31.9
3	38	00.0	103	08	30	7	25	31.8
3	39	08.5	102	42	30	7	25	31.4
3	40	06.2	102	20	50	7	25	31.9
3	41	00.0	102	00	20	7	25	31.6
3	42	12.5	101	32	30	7	25	29.7

Thermometer 74°.

Time, p. m.			Double altitudes of α Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	46	06.8	83	40	25	7	25	29.4
3	47	23.0	84	07	00	7	25	30.1
3	49	03.5	84	41	50	7	25	31.3
3	50	02.5	85	03	20	7	25	29.0
3	50	56.0	85	21	10	7	25	31.3
3	51	48.1	85	40	00	7	25	29.2
3	52	46.5	86	00	10	7	25	33.5
3	53	35.7	86	16	30	7	25	32.1
3	54	46.0	86	42	10	7	25	28.2

Thermometer 74°.

	h.	*m.*	*s.*
Chronometer fast by 9 obs. of west star	7	25	31.46
Chronometer fast by 9 obs. of east star.........			30.44
Mean......................	7	25	30.95

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APPENDIX No. 5—Continued.

July 30, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	01	31.0	74	38	55	38	02	47
4	03	07.8	74	39	55	38	03	03
4	04	23.0	74	41	15	38	03	06
4	05	17.1	74	41	50	38	02	54
4	06	17.0	74	42	30	38	02	52
4	07	15.2	74	43	00	38	02	46
4	08	08.0	74	43	50	38	02	52
4	09	04.5	74	44	20	38	02	50
4	10	12.2	74	45	20	38	02	55
4	11	18.5	74	45	50	38	02	45
4	12	20.0	74	46	55	38	03	06
4	13	26.0	74	47	40	38	02	54
4	14	11.2	74	48	30	38	03	04

Thermometer 74°.

Mean of 16 observations, 38° 02′ 55″.

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APPENDIX No. 5—Continued.

July 30, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
4	23	02.3	90	00	10	40	02.5	7	25	30.06
4	23	29.7	90	10	10	39	36.0	7	25	30.52
4	23	55.0	90	20	10	39	10.0	7	25	30.18
4	24	20.2	90	30	10	38	44.2	7	25	29.80
4	24	47.3	90	40	10	38	17.5	7	25	30.10
4	25	38.8	91	00	10	37	26.0	7	25	30.11
4	26	03.2	91	10	10	37	00.0	7	25	29.42
4	26	56.5	91	30	10	36	08.0	7	25	29.98
4	30	02.0	92	40	10	33	06.0	7	25	31.76
4	30	51.8	93	00	10	32	14.0	7	25	30.67
4	31	18.8	93	10	10	31	47.7	7	25	31.03
4	31	44.0	93	20	10	31	22.3	7	25	30.94
4	32	10.0	93	30	10	30	57.4	7	25	31.50
4	32	37.0	93	40	10	30	29.5	7	25	31.06
4	33	02.8	93	50	10	30	04.2	7	25	31.32
4	33	28.8	94	00	10	29	37.5	7	25	30.99

Thermometer 78°.

Mean of 16 observations, 7*h.* 25*m.* 30.59*s.*

DETERMINATION OF INDEX ERROR.

	Min.	*sec.*
On the arc..	31	30
Off the arc	31	30

Index error = 00″.

APPENDIX No. 5—Continued.

July 30, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitude of α Aquilæ, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
6	24	18.8	120	40	40	38	02	37
6	25	30.0	120	42	30	38	02	44
6	26	47.5	120	46	10	38	02	14
6	27	58.0	120	47	10	38	02	37
6	29	05.5	120	48	50	38	02	33
6	30	07.6	120	50	10	38	02	28
6	31	16.5	120	50	50	38	02	36
6	32	37.0	120	51	50	38	02	31
6	33	37.0	120	52	10	38	02	32
6	35	02.8	120	52	30	38	02	27
6	36	26.0	120	53	00	38	02	04
6	37	48.8	120	52	25	38	02	01
6	38	57.1	120	51	00	38	02	21
6	39	56.5	120	49	50	38	02	28
6	41	04.6	120	48	55	38	32	15
6	42	06.5	120	47	10	38	02	25
6	44	38.0	120	42	50	38	02	22
6	47	08.8	120	37	20	38	02	16

Thermometer 68°.

Mean of 18 observations, 38° 32′ 25″.

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APPENDIX No. 5—Continued.

July 31, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF LONGITUDE BY LUNAR DISTANCE.

Time, p. m.			*a* Aquilæ, and moon's west limb.			Double altitude of moon's upper limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	12	39.6	75	42	10	64	09	50	6	50	05.1
3	16	04.0	75	41	30	63	34	10	6	48	45.1
3	18	55.8	75	40	30	63	01	30	6	48	57.5
3	21	04.0	75	39	30	62	41	40	6	49	55.9
3	26	06.8	75	37	40	61	48	20	6	50	29.8
3	28	11.8	75	37	00	61	23	50	6	50	29.8
3	30	23.3	75	36	25	60	56	40	6	50	02.1

Time, p. m.			Spica Virginis, and moon's west limb.			Moon's lower limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	40	33.0	24	26	40	57	46	50	6	55	13.7
3	46	51.0	24	27	55	56	49	10	6	55	02.9
3	48	54.0	24	28	40	56	01	40	6	52	19.2
3	50	58.2	24	29	20	55	33	40	6	52	22.7

Thermometer 78°.

	h.	*m.*	*s.*
Longitude by 7 observations of *a* Aquilæ	6	49	49.33
" 4 " Spica	6	53	44.12
Mean	6	51	46.72

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APPENDIX No. 5—Continued.

July 31, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
4	18	04.2	87	50	10	44	49.5	7	25	27.20
4	18	31.0	88	00	10	44	23.5	7	25	27.62
4	18	55.9	88	10	10	43	57.2	7	25	26.93
4	19	21.7	88	20	10	43	32.0	7	25	27.24
4	19	48.0	88	30	10	43	05.5	7	25	27.15
4	20	13.6	88	40	10	42	39.8	7	25	27.10
4	20	39.0	88	50	10	42	13.8	7	25	27.21
4	21	06.0	89	00	10	41	48.0	7	25	27.42
4	21	32.0	89	10	10	41	22.0	7	25	27.43
4	21	57.5	89	20	10	40	57.7	7	25	28.04
4	22	23.0	89	30	10	40	30.0	7	25	26.94

Thermometer 77°.

Mean of 11 observations, 7*h.* 25*m.* 27.50*s.*

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APPENDIX No. 5—Continued.

July 31, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	05	05.8	91	12	50	7	25	28.0
4	05	52.3	90	54	05	7	25	26.3
4	06	40.5	90	35	55	7	25	28.0
4	07	36.4	90	14	20	7	25	28.1
4	08	32.7	89	52	50	7	25	29.0
4	09	27.7	89	31	00	7	25	27.9
4	10	22.8	89	09	30	7	25	27.8

Time, p. m.			Double altitudes of *a* Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	12	45.2	94	04	50	7	25	26.3
4	13	46.0	94	23	50	7	25	29.0
4	14	48.2	94	44	45	7	25	26.3
4	15	50.0	95	04	35	7	25	26.5
4	16	35.0	95	19	20	7	25	25.7
4	17	43.8	95	40	30	7	25	28.4
4	18	47.0	96	01	00	7	25	26.5

	h.	*m.*	*s.*
Chronometer fast by 7 obs. of west star	7	25	27.87
Chronometer fast by 7 obs. of east star			26.96
Mean	7	25	27.41

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APPENDIX No. 5—Continued.

July 31, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	27	45.2	75	00	30	38	02	45
4	28	50.0	75	01	15	38	02	43
4	30	06.3	75	01	50	38	02	33
4	31	20.5	75	02	50	38	02	36
4	32	07.5	75	04	00	36	02	55
4	33	07.0	75	04	40	38	02	52
4	34	08.8	75	05	30	38	02	52
4	35	19.6	75	06	05	38	02	43
4	36	13.0	75	06	30	38	02	36
4	44	03.0	75	13	00	38	02	55
4	45	20.7	75	13	30	38	02	40
4	46	26.8	75	14	20	38	02	40
4	47	09.0	75	14	50	38	02	39
4	48	05.5	75	15	40	38	02	46
4	48	46.6	75	16	05	38	02	39
4	49	35.2	75	16	50	38	02	45

Thermometer 76°.

Mean of 16 observations, 38° 02′ 44″.

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APPENDIX No. 5—Continued.

July 31, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Aquilæ, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
6	22	36.0	120	44	30	38	03	17
6	24	28.5	120	47	30	38	03	48
6	25	38.0	120	49	50	38	03	20
6	26	55.2	120	51	10	38	03	17
6	28	05.2	120	52	05	38	03	16
6	29	00.0	120	52	40	38	03	10
6	30	08.0	120	52	40	38	03	20
6	31	18.2	120	52	00	38	03	11
6	32	21.0	120	51	30	38	03	54
6	34	04.7	120	51	30	38	03	31
6	34	47.5	121	51	05	38	03	23
6	35	35.0	120	50	00	38	03	34
6	36	39.8	120	48	20	38	03	49
6	37	41.8	120	47	50	38	03	24
6	38	37.8	120	45	50	38	03	44
6	39	25.5	120	45	20	38	03	18
6	40	07.0	120	43	20	38	03	40

Thermometer 68°.

Mean of 17 observations, 38° 03′ 28″.

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APPENDIX No. 5—Continued.

July 31, 1846.—*Camp* 30.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Aquilæ from moon's west limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	12	39.6	75	42	10	6	50	05.1
3	16	04.0	75	41	30	6	48	45.1
3	18	55.8	75	40	30	6	48	57.5
3	21	04.0	75	39	30	6	49	55.9
3	26	06.8	75	37	40	6	50	29.8
3	28	11.8	75	37	00	6	50	29.8
3	30	23.3	75	36	25	6	50	02.1

Time, p. m.			Distance of *a* Virginis from moon's west limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	40	33.0	24	26	40	6	55	13.7
3	46	51.0	24	27	55	6	55	02.9
3	48	54.0	24	28	40	6	52	17.2
3	50	58.2	24	29	20	6	52	22.7

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APPENDIX No. 5—Continued.

August 1, 1846.—*Camp* 30.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Virginis from moon's west limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	24	02.0	37	40	05	6	53	22.0
3	27	34.5	37	41	30	6	53	30.1
3	29	27.8	37	42	05	6	53	11.0
3	31	30.0	37	43	00	6	53	38.3
3	33	31.5	37	43	40	6	53	24.2
3	35	48.0	37	44	25	6	53	11.0

Time, p. m.			Distance of *a* Aquilæ from moon's west limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	39	46.5	65	37	15	6	50	24.7
3	41	50.2	63	36	30	6	50	36.8
3	43	39.7	63	35	50	6	50	48.8
3	45	43.5	63	34	55	6	51	31.0
3	48	29.2	63	33	50	6	52	04.1
3	49	58.5	63	33	20	6	52	04.1
3	51	24.6	63	32	50	6	52	07.2

	h.	*m.*	*s.*
Longitude by 14 observations of *a* Aquilæ	6	50	35.86
Longitude by 10 observations of *a* Virginis.....	6	53	31.36
Mean	6	52	03.61

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APPENDIX No. 5—Continued.

August 1, 1846.—*Camp* 30, *near Bent's Fort.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
5	41	17.5	118	00	9	21	28.0	7	25	28.42
5	41	47.8	118	10	9	20	57.7	7	25	28.33
5	42	18.0	118	20	9	20	27.0	7	25	28.10
5	42	47.2	118	30	9	19	57.0	7	25	27.71
5	43	17.6	118	40	8	19	26.7	7	25	27.78
5	43	48.0	118	50	9	18	55.8	7	25	27.54
5	44	19.0	119	00	9	18	25.8	7	25	28.05
5	44	48.8	119	10	9	17	55.7	7	25	27.92
5	45	18.6	119	20	9	17	25.3	7	25	27.64
5	46	20.2	119	40	9	16	24.2	7	25	27.81
5	46	50.8	119	50	9	15	55.8	7	25	28.02
5	47	21.0	120	00	9	15	23.2	7	25	27.84

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APPENDIX No. 5—Continued.

August 3, 1846.—*Camp* 32.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	42	40.2	96	04	00	7	27	03.3
3	45	35.7	94	55	50	7	27	03.0
3	47	24.0	94	14	05	7	27	03.7
3	48	17.8	93	52	30	7	27	01.9
3	49	02.7	93	35	30	7	27	03.0
3	49	52.5	93	16	10	7	27	03.1
3	50	31.6	93	01	00	7	27	03.1
3	51	18.8	92	41	50	7	27	01.2

Thermometer 76°.

Time, p. m.			Double altitudes of *a* Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	54	06.0	91	36	40	7	27	02.3
3	54	46.8	91	49	50	7	27	04.0
3	55	38.5	92	07	30	7	27	02.9
3	56	40.0	92	27	25	7	27	04.9
3	57	36.1	92	46	00	7	27	05.1
3	58	25.2	93	02	40	7	27	04.1
3	59	13.1	93	17	40	7	27	06.9

Thermometer 76°.

	h.	*m.*	*s.*
Chronometer fast by 8 obs. of west star	7	27	02.79
Chronometer fast by 7 obs. of east star			04.31
Mean	7	27	03.55

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APPENDIX No. 5—Continued.

August 3, 1846.—*Camp* 32.

DETERMINATION OF LATITUDE.

Time. p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	03	41.0	74	15	05	37	44	59
4	04	36.6	74	15	55	37	45	06
4	05	28.5	74	16	30	37	45	01
4	06	35.0	74	16	55	37	44	55
4	07	11.8	74	17	40	37	45	01
4	08	09.7	74	18	05	37	44	54
4	09	03.5	74	18	35	37	44	50
4	09	46.3	74	18	55	37	44	45
4	10	39.0	74	19	55	37	44	55

Thermometer 75°.

Mean of 9 observations, 37° 44′ 56″.

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APPENDIX No. 5—Continued.

August 5, 1846.—*Camp* 34, *on the Purgatory.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	06	29.5	73	15	05	37	12	06
4	07	52.0	73	15	50	37	11	59
4	08	51.2	73	16	40	37	12	03
4	09	53.3	73	17	10	37	11	55
4	12	43.0	73	19	30	37	12	02
4	13	40.8	73	20	05	37	11	59
4	15	15.5	73	20	55	37	11	49
4	15	53.4	73	21	40	37	11	58
4	19	55.0	73	24	20	37	11	46
4	20	38.8	73	25	30	37	12	06
4	21	14.6	73	25	50	37	12	04
4	21	50.0	73	26	10	37	12	00
4	22	34.6	73	26	40	37	11	54

Thermometer 67°.

Wind very high; observations imperfect.

Mean of 13 observations, 37° 11′ 59″.

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APPENDIX No. 5—Continued.

August 5, 1846.—*Camp* 34, *on the Purgatory.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Aquilæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	28	01.5	104	44	20	7	29	24.7
4	29	21.3	105	06	55	7	29	26.9
4	30	16.6	105	22	50	7	29	27.2
4	31	24.0	105	41	50	7	29	28.6
4	32	12.7	105	55	50	7	29	28.4
4	33	14.5	106	13	30	7	29	28.2
4	34	28.0	106	35	00	7	29	25.6

Thermometer 67°.

Mean of 7 observations, 7*h.* 29*m.* 27.09*s.*

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APPENDIX No. 5—Continued.

August 6, 1846.—*Camp* 35, *in the Raton.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	46	15.5	72	40	50	37	00	36
3	47	57.8	72	41	40	37	00	25
3	49	20.7	72	42	40	37	00	26
3	50	48.8	72	43	40	37	00	22
3	51	52.7	72	44	20	37	00	20
3	53	05.5	72	45	20	37	00	24
3	54	07.5	72	45	50	37	00	15
3	55	28.0	72	46	30	37	00	06
3	56	21.6	72	47	30	37	00	17

Thermometer 64°.

Mean of 9 observations, 37° 00′ 21″.

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APPENDIX No. 5—Continued.

August 6, 1846.—*Camp* 35, *in the Raton.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	00	00.8	85	48	55	7	29	28.4
4	01	09.0	85	22	15	7	29	29.6
4	02	09.0	84	58	20	7	29	29.4
4	03	06.6	84	35	45	7	29	30.2
4	04	19.7	84	08	05	7	29	33.8 rej.
4	05	12.5	83	45	50	7	29	30.7
4	06	18.8	83	19	55	7	29	31.9

Thermometer 64°.

Time, p. m.			Double altitudes of *a* Aquilæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	11	33.4	101	09	55	7	29	31.9
4	13	42.8	101	50	00	7	29	32.3
4	14	54.7	102	11	50	7	29	33.5
4	15	50.5	102	28	40	7	29	34.4
4	16	43.6	102	45	10	7	29	33.5
4	17	42.5	103	03	10	7	29	33.2
4	18	52.0	103	24	10	7	29	33.4

Thermometer 63°.

	h.	*m.*	*s.*
Chronometer fast by 6 observations of west star..	7	29	30.03
Chronometer fast by 7 observations of east star..			33.17
Mean....................	7	29	31.60

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APPENDIX No. 5—Continued.

August 7, 1846.—Camp 36, on the Canadian, south side, about one and a half mile below the crossing.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	35	22.7	94	01	50	7	29	20.2
3	36	14.5	93	41	30	7	29	20.6
3	37	01.0	93	22	30	7	29	19.1
3	37	45.3	93	04	55	7	29	18.9
3	38	39.0	92	44	20	7	29	20.5
3	39	34.6	92	21	40	7	29	18.9
3	40	13.0	92	04	50	7	29	14.8 rej.
3	41	02.0	91	47	35	7	29	20.1

Thermometer 59°.

Time, p. m.			Double altitudes of *a* Aquilæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	43	56.5	93	43	00	7	29	22.7
3	45	13.3	94	09	30	7	29	21.6
3	46	15.8	94	30	20	7	29	22.6
3	47	01.0	94	46	00	7	29	21.0
3	47	53.8	95	03	05	7	29	24.5
3	48	43.0	95	19	50	7	29	22.8
3	49	36.2	95	37	40	7	29	23.2
3	50	34.0	95	57	15	7	29	22.5

Thermometer 59°.

	h	*m.*	*s.*
Chronometer fast by 7 observations of west star ...	7	29	19.76
" 8 " east star ...			22.61
Mean.....................	7	29	21.18

APPENDIX No. 5—Continued.

August 7, 1846.—*Camp* 36.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m,*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	55	48.0	72	23	45	36	47	11
3	56	59.3	72	24	55	36	47	25
3	57	59.3	72	25	40	36	47	25
3	59	09.0	72	27	00	36	47	37
4	00	32.6	72	28	10	36	47	52
4	01	39.0	72	28	50	36	47	38
4	02	25.3	72	29	55	36	47	54
4	03	31.0	72	30	25	36	47	44
4	04	15.0	72	31	00	36	47	45
4	05	24.2	72	31	10	36	47	25
4	06	15.5	72	31	40	36	47	21

Thermometer 59°.

Mean of 11 observations, 36° 47′ 34″.

Variation of the needle, determined by the eastern elongation of Polaris, = 12° east.

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APPENDIX No. 5—Continued.

August 8, 1846.—*Camp* 36.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Aquilæ in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
4	01	14.8	100	44	25	7	29	16.8	
4	02	07.6	100	59	55	7	29	20.4	
4	03	02.2	101	17	20	7	29	19.8	
4	03	53.7	101	33	30	7	29	19.7	
4	05	12.8	101	57	45	7	29	21.4	
4	06	08.8	102	15	50	7	29	19.1	
4	07	03.7	102	33	25	7	29	17.2	
4	08	03.5	102	52	30	7	29	15.1	rej.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	10	06.0	78	37	10	7	29	17.7
4	11	00.8	78	15	30	7	29	18.7
4	11	57.7	77	52	30	7	29	18.9
4	12	48.0	77	32	05	7	29	17.3
4	13	59.8	77	03	25	7	29	17.4
4	14	53.7	76	41	30	7	29	16.6
4	15	38.0	76	24	20	7	29	18.1
4	16	42.5	75	57	35	7	29	15.9
4	17	32.5	75	38	30	7	29	18.2
4	18	12.8	75	21	30	7	29	16.1

Thermometer 63°.

	h.	*m.*	*s.*
Chronometer fast by 7 obs. of east star...........	7	29	19.29
" 10 " west star			17.49
Mean	7	29	18.34

DETERMINATION OF INDEX ERROR.

	Min.	*sec.*	*Min.*	*sec.*
On the arc..................	31	40	31	35
Off the arc	31	45	31	45

Index error = + 3.7.

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APPENDIX No. 5—Continued.

August 10, 1846.—*Camp* 33, *on the Ciman Citon.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	10	58.7	99	36	40	7	30	32.9
3	11	49.0	99	17	25	7	30	34.3
3	12	40.2	98	56	45	7	30	33.1
3	13	43.5	98	31	40	7	30	82.7
3	14	31.0	98	13	00	7	30	32.9
3	15	17.0	97	54	45	7	30	32.6
3	16	10.0	97	34	10	7	30	33.5

Thermometer 59°.

Time, p. m.			Double altitudes of *a* Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	18	54.0	89	01	35	7	30	33.1
3	20	08.2	89	27	40	7	30	34.1
3	21	17.1	89	52	25	7	30	33.1
3	22	34.1	90	18	45	7	30	35.6
3	23	43.8	90	43	20	7	30	35.6
3	24	43.5	91	03	55	7	30	36.5
3	25	27.0	91	20	00	7	30	34.4

Thermometer 59°.

	h.	*m.*	*s.*
Chronometer fast by 7 obs. of east star............	7	30	34.63
Chronometer fast by 7 obs. of west star..........			33.14
Mean	7	30	33.88

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APPENDIX No. 5—Continued.

August 10, 1846.—*Camp* 38.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	29	03.5	71	33	25	36	27	43
3	29	58.0	71	34	00	36	27	44
3	31	09.0	71	35	10	36	27	52
3	32	20.0	71	35	50	36	27	47
3	33	25.0	71	36	50	36	27	54
3	34	36.5	71	37	30	36	27	50
3	35	27.2	71	38	20	36	27	59
3	36	14.5	71	38	50	36	27	55
3	37	03.8	71	39	10	36	27	47
3	37	45.4	71	39	55	36	27	52
3	38	44.0	71	40	30	36	27	51

Thermometer, 58°.

Mean of 11 observations, 36° 27′ 50″.

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APPENDIX No. 5—Continued.

August 12, 1846.—*Camp* 40.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
9	16	50.0	71	35	30	7	31	26.9
9	17	38.5	71	18	15	7	31	28.3
9	18	44.6	70	53	50	7	31	27.7
9	19	43.0	70	31	50	7	31	26.0
9	20	24.2	70	16	10	7	31	24.4
9	21	11.8	69	59	20	7	31	25.9
9	22	03.6	69	40	15	7	31	25.5

Time, a. m.—August 13.			Double altitudes of sun's upper limb.		Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
4	05	34.3	77	50	7	31	25.0
4	06	00.5	78	00	7	31	26.1
4	06	26.2	78	10	7	31	26.7
4	06	51.7	78	20	7	31	27.1
4	07	16.2	78	30	7	31	26.5
4	07	41.0	78	40	7	31	26.2
4	08	05.0	78	50	7	31	25.1
4	08	29.2	79	00	7	31	24.1
4	08	54.2	79	10	7	31	24.0
4	09	20.0	79	20	7	31	24.6
4	09	44.6	79	30	7	31	24.1

Thermometer 66°.

	h.	*m.*	*s.*
Chronometer fast by 11 observations of sun in east	7	31	25.49
Rate for 7 hours..................................			88
Chronometer fast at 13*h.*, August 12...............	7	31	26.37
Chronometer fast by *a* Lyræ, in the west			26.39
Mean.........................	7	31	26.38

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APPENDIX No. 5—Continued.

August 12, 1846.—*Camp* 40.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
9	27	11.2	74	33	30	35	54	06
9	28	38.0	74	34	25	35	54	19
9	30	09.0	74	35	00	35	54	20
9	31	14.7	74	35	30	35	54	24
9	32	18.5	74	36	00	35	54	29
9	33	18.5	74	36	00	35	54	18
9	34	27.0	74	36	50	35	54	31
9	35	25.8	74	37	00	35	54	26
9	36	38.5	74	37	15	35	54	22
9	37	38.5	74	37	30	35	54	19

Thermometer 49°.

Mean of 10 observations, 35° 54′ 21″.

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APPENDIX No. 5—Continued.

August 14, 1846.—*Camp* 42, *about one mile south of the Vegas.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	42	51.8	81	21	30	7	32	05.0
3	44	19.8	80	45	45	7	32	05.1
3	45	35.9	80	16	15	7	32	08.9
3	46	38.2	79	50	50	7	32	08.7
3	47	42.7	79	24	20	7	32	08.1
3	48	58.6	78	53	10	7	32	07.4
3	49	55.0	78	30	30	7	32	08.1

Thermometer 60°.

Time, p. m.			Double altitudes of α Aquilæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	52	21.4	105	59	30	7	32	06.3
3	53	39.0	106	23	45	7	32	05.5
3	54	51.7	106	47	25	7	32	01.5
3	56	02.5	107	08	20	7	32	03.8
3	57	12.0	107	29	35	7	32	03.1
3	58	18.8	107	49	50	7	32	02.9
3	59	19.0	108	07	30	7	32	04.4

Thermometer 60°.

	h.	*m.*	*s.*
Chronometer fast by 7 observations of east star...	7	32	03.93
" 7 " west star...			07.36
Mean......................	7	32	05.64

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APPENDIX No. 5—Continued.

August 14, 1846.—*Camp* 42, *one mile south of the Vegas.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	03	54.2	70	23	25	35	34	50
4	05	06.0	70	24	10	35	34	46
4	05	51.0	70	25	30	35	35	08
4	06	52.5	70	25	50	35	34	55
4	08	09.0	70	26	50	35	34	56
4	09	09.0	70	28	10	35	35	13
4	10	11.5	70	29	10	35	35	21
4	11	12.0	70	29	50	35	35	15
4	11	59.0	70	30	35	35	35	20

Thermometer 60°.

Mean of 9 observations, 35° 35′ 05″.

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APPENDIX No. 5—Continued.

August 15, 1846.—*Camp* 43, *Vernal Spring*.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	25	03.0	87	14	30	7	32	35.7
3	25	59.0	86	51	40	7	32	35.5
3	26	57.1	86	28	30	7	32	36.7
3	27	45.2	86	08	50	7	32	36.5
3	28	26.7	85	51	30	7	32	35.4
3	29	09.8	85	33	55	7	32	35.3
3	29	57.3	85	15	10	7	32	36.7

Thermometer 68°.

Time, p. m.			Double altitudes of *a* Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	33	34.8	101	18	30	7	32	30.9
3	34	31.1	101	38	25	7	32	30.3
3	35	34.1	101	58	30	7	32	32.3
3	36	23.0	102	14	30	7	32	32.8
3	37	10.5	102	30	05	7	32	32.8
3	38	15.0	102	51	40	7	32	31.2
3	39	17.0	103	11	15	7	32	33.2

Thermometer 65°.

	h.	*m.*	*s.*
Chronometer fast by 7 observations of east star	7	32	31.93
" " 7 " west star			35.97
Mean....................	7	32	33.95

APPENDIX No. 5—Continued.

August 15, 1846.—*Camp* 43.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	48	13.5	69	50	40	35	23	05
3	49	19.5	69	51	30	35	23	06
3	50	03.2	69	52	15	35	23	12
3	51	08.5	69	53	30	35	23	25
3	51	59.2	69	54	25	35	23	32
3	53	06.0	69	54	55	35	23	23
3	53	59.0	69	55	25	35	23	10
3	54	54.0	69	56	20	35	23	03
3	55	49.5	69	57	00	35	23	24

Thermometer 65°.

Mean of 9 observations, 35° 23′ 19″.

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APPENDIX No. 5—Continued.

August 19, 1816.—*Santa Fé.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Coronæ Borealis in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
4	32	23.0	93	16	00	7	34	49.3	rej.
4	33	37.7	92	47	05	7	34	52.8	
4	34	35.0	92	23	40	7	34	52.4	
4	35	26.8	92	02	00	7	34	50.9	
4	36	20.0	91	41	05	7	34	52.5	
4	37	12.9	91	18	50	7	34	50.7	
4	38	31.7	90	48	20	7	34	54.4	rej.
4	39	26.0	90	24	35	7	34	50.1	
4	40	23.0	90	01	40	7	34	50.6	

Thermometer 60°.

Time, p. m.			Double altitudes of *a* Pegasi in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
5	10	46.0	77	41	25	7	34	62.7	rej.
5	11	51.2	78	10	00	7	34	55.5	
5	12	39.6	78	28	25	7	34	57.9	
5	13	38.8	78	51	20	7	34	59.5	rej.
5	14	22.0	79	10	00	7	34	56.0	
5	15	19.0	79	33	20	7	34	54.4	
5	16	23.8	79	57	20	7	34	54.5	
5	17	31.2	80	23	20	7	34	61 2	rej.
5	18	32.5	80	49	30	7	34	56.8	

Thermometer 59°.

	h.	*m.*	*s.*
Chronometer fast by 6 observations of east star....	7	34	55.82
Chronometer fast by 7 observations of west star...			51.43
Mean...........................	7	34	53.62

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APPENDIX No. 5—Continued.

August 19, 1846.—*Santa Fé.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	24	20.0	71	51	10	35	40	47 rej.
5	25	34.0	71	52	40	35	41	03
5	26	51.0	71	53	50	35	41	09
5	27	52.5	71	54	40	35	41	11
5	28	47.0	71	55	40	35	41	18
5	30	07.5	71	56	30	35	41	12
5	30	55.2	71	57	10	35	41	13
5	31	28.0	71	57	55	35	41	23

Thermometer 59°.

Mean of 7 observations, 35° 41′ 13″.

APPENDIX No. 5—Continued.

August 20, 1846.—*Santa Fé.*

DETERMINATION OF TIME.

Time, p. m.	Double altitudes of Coronæ Borealis.	Chronometer fast.
h. m. s.	*Deg. min. sec.*	
3 40 19.0	93 25 45	
3 41 49.5	92 47 10	
3 43 04.7	92 17 50	

Time, p. m.	Double altitudes of Arcturus in the west.	Chronometer fast.
h. m. s.	*Deg. min sec.*	
3 44 54.5	72 01 20	
3 45 46.2	71 40 30	
3 46 46.2	71 17 00	
3 47 36.2	70 56 10	
3 48 28.0	70 35 40	
3 49 26.9	70 11 00	
3 50 18.0	69 50 25	
3 51 09.8	69 29 50	
3 52 01.0	69 08 50	

Thermometer 62°.

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APPENDIX No. 5—Continued.

August 20, 1846—*Santa Fé.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	57	08.4	70	46	30	35	41	17
3	58	20.2	70	47	20	35	41	14
3	59	14.0	70	47	50	35	41	11
3	59	50.0	70	48	30	35	41	14
4	50	47.8	70	49	30	35	41	21
4	01	18.5	70	49	50	35	41	19
4	01	57.5	70	50	10	35	41	15
4	02	56.0	70	51	05	35	41	27
4	03	12.0	70	51	10	35	41	25

Thermometer 62°.

Mean of 9 observations, 35° 41′ 13″.

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APPENDIX No. 5—Continued.

August 21, 1846.—*Santa Fé.*

Time, a. m.			Double altitudes of the sun's upper limb.	
h.	*m.*	*s.*	*Deg.*	*min.*
5	09	35.5	98	50
5	10	04.0	99	00
5	10	58.0	99	20
5	11	25.5	99	30
5	11	53.8	99	40
5	12	21.5	99	50
5	12	47.8	100	00
5	13	44.0	100	20
5	14	12.5	100	30
5	14	39.2	100	40

Thermometer 68°.

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APPENDIX No. 5—Continued.

August 22, 1846.—*Santa Fe.*

DETERMINATION OF TIME.

Time, a. m.—August 23.			Double altitudes of sun's upper limb.		Time, p. m.—Aug. 22.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
4	57	26.0	93	40	10	18	08.2	7	34	46.44
4	56	58.0	93	30	10	18	36.8	7	34	46 82
4	56	31.3	93	20	10	19	02.8	7	34	46.55
4	56	05.0	93	10	10	19	28.7	7	34	46.42
4	55	38.5	93	00	10	19	55.6	7	34	46.70
4	55	11.2	92	50	10	20	22.5	7	34	46.50
4	54	44.5	92	40	10	20	50.0	7	34	47.03
4	54	17.5	92	30	10	21	15.0	7	34	46.10

Thermometer 64°.

Mean of 8 observations, 7*h.* 34*m.* 46.58*s.*

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APPENDIX No.5—Continued.

August 22, 1846.—*Santa Fé.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.	
h.	*m.*	*s.*	*Deg.*	*min.*
5	19	22.8	102	00
5	19	51.0	102	10
5	20	19.8	102	20
5	20	43.8	102	30
5	21	10.0	102	40
5	21	43.5	102	50
5	22	13.0	103	00
5	22	40.5	103	10
5	23	08.5	103	20
5	23	36.0	103	30
5	24	05.4	103	40
5	24	34.0	103	50
5	25	03.0	104	00

Thermometer 60°.

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APPENDIX No. 5—Continued.

August 22, 1846.—*Santa Fé.*

Time, p. m.			Double altitude of Coronæ Borealis.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
4	29	08.0	89	46	50
4	30	17.0	89	19	20
4	31	14.0	88	55	10
4	31	55.3	88	59	00
4	32	48.1	88	18	20
4	33	56.7	87	50	00
4	34	58.1	87	25	00
4	35	43.2	87	06	50
4	36	32.8	86	46	20

Thermometer 64°.

Time, p. m.			Double altitudes of *a* Pegasi.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
5	43	19.5	95	12	35
5	44	20.5	95	35	40
5	45	24.9	96	01	05
5	46	02.0	96	14	15
5	46	48.0	96	32	30
5	47	30.0	96	48	50
5	48	18.0	97	07	00
5	49	06.8	97	26	00
5	49	57.5	97	45	25

Thermometer 64°.

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APPENDIX No. 5—Continued.

August 22, 1846.—*Santa Fé.*

Time, p. m.			Double altitudes of *a* Aquilæ near the meridian.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
5	00	33.0	125	16	05
5	01	29.5	125	18	05
5	02	32.0	125	21	00
5	03	39.3	125	23	55
5	04	54.0	125	27	20
5	06	20.8	125	30	15
5	07	18.0	125	31	30
5	08	21.5	125	33	10
5	09	17.5	125	33	50
5	10	04.8	125	34	20
5	11	10.6	125	35	40
5	14	10.0	125	38	40
5	16	12.0	125	37	40
5	17	28.4	125	36	55
5	18	15.5	125	35	00
5	21	14.2	125	32	20
5	22	39.5	125	29	00
5	23	50.0	125	23	40
5	25	16.5	125	21	05
5	26	37.0	125	17	00

Thermometer 64°.

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APPENDIX No. 5—Continued.

August 23, 1846.—*Santa Fé.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
4	54	17.5	92	30	10	19	46.5	7	34	44.54
4	54	44.5	92	40	10	19	19.8	7	34	44.69
4	55	11.2	92	50	10	18	54.0	7	34	45.13
4	55	38.5	93	00	10	18	26.6	7	34	45.07
4	56	05.0	93	10	10	17	50.5	7	34	45.26
4	56	31.3	93	20	10	17	34.0	7	34	45.15
4	56	58.0	93	30	10	17	05.8	7	34	44.39
4	57	26.0	93	40	10	16	39.4	7	34	45.10
4	57	52.0	93	50	10	16	13.5	7	34	45.22
4	58	20.1	94	00	10	15	47.1	7	34	46.02
4	58	45.8	94	10	10	15	19.7	7	34	45.21
4	59	15.5	94	20	10	14	52.5	7	34	45.45
4	59	39.8	94	30	10	14	24.0	7	34	44.35

Thermometer 69°.

Mean of 13 observations, 7*h.* 34*m.* 45.05*s.*

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APPENDIX No. 5—Continued.

August 23, 1846.—*Santa Fé.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of α Aquilæ, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	59	37.0	125	24	40	35	40	22
5	00	47.0	125	26	00	35	41	00 rej.
5	01	38.8	125	28	55	35	40	23
5	02	57.8	125	30	40	35	40	39
5	03	50.7	125	32	00	35	40	38
5	04	51.5	125	33	20	35	40	37
5	06	17.0	125	34	30	35	40	44
5	07	22.5	125	35	25	35	40	39
5	09	24.5	125	36	00	35	40	41
5	10	42.0	125	36	10	35	40	34
5	11	41.0	125	36	10	35	40	25
5	12	31.5	125	36	00	35	40	17
5	13	47.5	125	34	50	35	40	22
5	15	35.6	125	33	00	35	40	17
5	16	42.3	125	30	10	35	40	54 rej.
5	17	58.5	125	27	50	35	40	58 rej.
5	19	12.5	125	26	05	35	40	36
5	20	10.0	125	23	40	35	40	43

Thermometer 69°.

Mean of 15 observations, 35° 40′ 32″.

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APPENDIX No. 5—Continued.

August 24, 1846 —*Santa Fé.*

Time, a. m.			Double altitudes of sun's upper limb.	
h.	*m.*	*s.*	*Deg.*	*min.*
4	55	39.0	92	40
4	56	04.0	92	50
4	56	32.2	93	00
4	56	59.0	93	10
4	57	25.8	93	20
4	57	53.8	93	30
4	58	19.7	93	40
4	58	47.0	93	50
4	59	14.5	94	00
4	59	42.1	94	10
5	00	08.5	94	20

Thermometer 68°.

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APPENDIX No. 5—Continued.

August 28, 1846—*Santa Fé.*

Time, p. m.			Double altitudes of sun's upper limb.		Time, a. m.—August 29.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
10	45	22.0	80	00	4	26	24.5
10	45	48.1	79	50	4	25	58.5
10	46	14.5	79	40	4	25	32.5
10	46	40.0	79	30	4	25	05.5
10	47	07.5	79	20	4	24	39.2
10	47	32.0	79	10	4	24	14.5
10	47	58.2	79	00	4	23	47.5
10	48	21.8	78	50	4	23	21.2
10	48	51.8	78	40	4	22	55.5
10	49	16.4	78	30	4	22	29.0
10	49	42.7	78	20	4	22	03.4
10	50	08.6	78	10	4	21	35.3
10	50	34.6	78	00	4	21	12.2
10	51	00.0	77	50	4	20	44.5
10	51	26.2	77	40	4	20	18.8
10	51	52.5	77	30	4	19	53.0
Thermometer 70°.					Thermometer 66°.		

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APPENDIX No. 5—Continued.

August 29, 1846.—*Santa Fe.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Aquilæ from moon's western limb.			Double altitudes of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	05	55.0	55	49	50	60	38	10
3	07	05.0	55	49	00	60	25	10
3	09	59.0	55	48	00	59	53	50
3	12	03.8	55	46	55	59	33	30
3	15	12.0	55	45	45	58	55	30
3	17	00.0	55	45	20	58	35	30
3	19	05.6	55	44	20	58	11	20
3	21	19.0	55	43	40	57	45	40

Thermometer 69°.

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APPENDIX No. 5—Continued.

August 29, 1846.—*Santa Fé.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
4	26	24.5	80	00	10	43	51.5	7	34	31.65
4	25	58.5	79	50	10	44	18.8	7	34	32.31
4	25	32.5	79	40	10	44	44.6	7	34	32.22
4	25	05.5	79	30	10	45	10.6	7	34	31.73
4	24	39.2	79	20	10	45	38.0	7	34	32.29
4	24	14.5	79	10	10	46	03.8	7	34	32.84
4	23	47.5	79	00	10	46	30.0	7	34	32.45
4	23	21.2	78	50	10	46	55.8	7	34	32.21
4	22	55.5	78	40	10	47	21.5	7	34	32.22
4	22	29.0	78	30	10	47	47.0	7	34	31.73
4	22	03.4	78	20	10	48	13.5	7	34	32.18
4	21	35.3	78	10	10	48	40.0	7	34	31.39
4	21	12.2	78	00	10	49	05.8	7	34	32.75
4	20	44.5	77	50	10	49	31.8	7	34	31.91
4	20	18.8	77	40	10	49	57.8	7	34	31.67
4	19	53.0	77	30	10	50	24.2	7	34	32.38
Thermom. 66°.					Thermom. 72°.					

Mean of 16 observations, 7*h*. 54*m*. 32.12*s*.

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APPENDIX No. 5—Continued.

August 29, 1846.—*Santa Fe.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	22	59.8	72	22	05	35	41	35
5	23	50.5	72	22	20	35	41	20
5	24	54.0	72	23	10	35	41	23
5	25	30.0	72	24	00	35	41	34
5	26	21.5	72	24	30	35	41	30
5	27	04.8	72	25	30	35	41	44
5	27	58.5	72	26	00	35	41	39
5	28	57.0	72	26	40	35	41	37
5	29	42.5	72	27	05	35	41	33

Thermometer 68°.

Mean of 9 observations, 35° 41′ 33″.

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APPENDIX No. 5—Continued.

August 29, 1846.—*Santa Fe.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
6	23	30.0	96	10	15	35	40	56
6	24	16.8	96	10	25	35	41	09
6	25	13.8	96	10	30	35	41	11
6	26	46.8	96	10	30	35	41	11
6	27	32.0	96	11	15	35	40	44
6	28	22.8	96	11	00	35	40	43
6	29	04.7	96	10	20	35	40	54
6	29	34.2	96	09	55	35	40	58
6	30	15.5	96	09	25	35	41	01
6	30	59.0	96	58	30	35	41	12
6	31	33.5	96	08	00	35	41	12

Thermometer 66°

Mean of 11 observations, 35° 41′ 01″.

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APPENDIX No. 5—Continued.

August 29, 1846.—*Santa Fe.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
6	51	57.5	106	26	30	35	40	49
6	53	23.0	106	28	10	35	40	56
6	54	36.8	106	29	40	35	40	52
6	55	44.0	106	30	55	35	40	45
6	57	42.0	106	32	30	35	40	35
6	58	56.1	106	32	10	35	40	57
7	01	45.8	106	32	00	35	41	01
7	03	19.2	106	31	30	35	40	57
7	04	11.0	106	30	50	35	41	01
7	05	00.0	106	29	55	35	41	09
7	06	10.8	106	28	30	35	41	18
7	07	20.0	106	27	30	35	41	08
7	08	38.4	106	26	30	35	40	45
7	09	22.8	106	24	45	35	41	05

Thermometer 66°.

Mean of 14 observations, 35° 40′ 57″.

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APPENDIX No. 5—Continued.

August 29, 1846.—*Santa Fe.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Aquilæ from moon's west limb.			Longitude.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	05	55.0	55	49	50	7	05	52.5	rej.
3	07	05.0	55	49	00	7	04	25.1	
3	09	59.0	55	48	00	7	04	41.8	
3	12	03.8	55	46	55	7	03	48.4	
3	15	12.0	55	45	45	7	03	51.1	
3	17	00.0	55	45	20	7	04	33.8	
3	19	05.6	55	44	20	7	03	59.1	
3	21	19.0	55	43	40	7	04	25.8	

August 30, 1846.—*Santa Fe.*

Time, p. m.			Distance of Antares from moon's west limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	42	09.0	16	15	55	7	04	39.7
3	43	39.8	16	16	40	7	04	02.2
3	48	23.8	16	18	20	7	03	59.3
3	50	33.5	16	18	50	7	04	42.6
3	51	48.0	16	19	20	7	04	28.2
3	52	49.1	16	19	40	7	04	36.8
3	55	59.5	16	20	30	7	04	22.4
3	56	57.5	16	21	15	7	04	08.0

	h.	*m.*	*s.*
Longitude by 7 observations of *a* Aquilæ	7	04	14.73
" 8 " Antares	7	04	22.40
Mean......	7	04	18.56

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APPENDIX No. 5—Continued.

September 1, 1846.—*Santa Fe.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Coronæ Borealis.			Chronometer fast.
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	
3	29	17.8	97	57	35	
3	30	52.0	97	20	00	
3	31	40.1	97	00	15	
3	32	32.5	96	39	10	
3	33	32.0	96	14	30	
3	34	26.0	95	53	10	
3	36	32.1	95	01	30	

Time, p. m.			Double altitudes of α Aquarii, in the east.			Chronometer fast.
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	
3	53	23.8	92	10	30	
3	54	28.6	92	34	00	
3	55	16.5	92	51	40	
3	56	07.6	93	09	50	
3	57	08.8	93	31	20	
3	57	50.5	93	46	30	
3	58	34.3	94	02	15	

Thermometer 70°.

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APPENDIX No. 5—Continued.

September 4, 1846.—Camp 49, on the Rio del Norte, near the Alalavo.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Aquilæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	41	22.8	108	33	40	7	37	03.0
2	42	06.5	108	46	35	7	37	04.0
2	43	00.5	109	02	40	7	37	04.7
2	43	42.0	109	14	55	7	37	05.4

Thermometer 64°.

Time, p. m.			Double altitudes of Arcturus in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	53	28.8	69	52	00	7	37	06.2
2	54	15.5	69	34	15	7	37	07.5
2	55	10.0	69	09	20	7	37	03.2 rej.
2	56	11.9	68	45	40	7	37	07.2
2	57	07.0	68	23	00	7	37	06.9
2	58	09.8	67	57	55	7	37	08.5
2	59	04.0	67	35	35	7	37	08.0
2	59	58.4	66	13	00	7	37	07.2
3	00	49.0	65	52	50	7	37	07.7

Thermometer 64°.

	h.	*m.*	*s.*
Chronometer fast by 4 obs. of east star...........	7	37	04.28
Chronometer fast by 8 obs. of west star..........			07.40
Mean......................	7	37	05.84

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APPENDIX No. 5—Continued.

September 4, 1846.—Camp 49, on the Rio del Norte, near the Alalavo.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	06	11.0	69	51	35	35	11	19
3	07	08.0	69	52	25	35	11	21
3	08	35.5	69	53	35	35	11	17
3	09	45.0	69	54	20	35	11	18
3	10	51.3	69	55	10	35	11	17
3	11	48.5	69	56	00	35	11	20
3	12	44.0	69	56	30	35	11	13
3	13	20.0	69	57	10	35	11	20
3	13	56.8	69	57	55	35	11	32
3	14	54.5	69	58	30	35	11	21
3	15	30.3	69	59	00	35	11	22
3	16	19.0	69	59	40	35	11	25
3	17	03.4	70	00	00	35	11	18

Thermometer 64°.

Mean of 13 observations, 35° 11′ 20″.

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APPENDIX No. 5—Continued.

September 6, 1846.—*Peralta, about* 500 *feet north of the Charois chapel.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of a Coronæ Borealis.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
5	36	42.2	87	58	00	7	37	15.9
3	37	43.6	87	31	55	7	37	13.6
3	38	44.0	87	07	45	7	37	14.9
3	39	37.1	86	46	15	7	37	15.4
3	40	42.5	86	19	45	7	37	15.8
3	41	46.0	85	53	10	7	37	14.4
3	43	09.0	85	19	00	7	37	13.7
3	44	14.3	84	51	50	7	37	12.5
3	45	01.2	84	33	20	7	37	14.0
3	46	12.8	84	03	50	7	37	13.4
3	47	12.3	83	39	40	7	37	13.6
3	48	03.8	83	18	50	7	37	14.1

Thermometer 60°.

Mean of 12 observations, 7*h*. 37*m*. 14.28*s*.

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APPENDIX No. 5—Continued.

September 6, 1846.—*Peralta.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	53	54.0	69	54	30	34	50	49
3	56	13.5	69	56	30	34	50	55
3	57	39.0	69	57	10	34	50	56
3	58	52.8	69	58	40	34	50	56
4	00	03.7	69	59	40	34	50	59
4	01	09.2	70	00	45	34	51	06
4	02	16.8	70	01	20	34	50	57
4	11	29.2	70	07	55	34	50	58
4	12	37.5	70	09	40	34	51	05
4	13	30.2	70	10	10	34	50	59
4	14	51.0	70	10	50	34	50	47
4	15	52.5	70	11	55	34	50	55
4	16	58.1	70	13	00	34	51	03

Thermometer 56°.

Mean of 13 observations, 34° 50′ 57″.

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APPENDIX No. 5—Continued.

September 6, 1846.—Peralta.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Pegasi, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	36	53.8	91	52	10	7	37	15.2
4	37	44.5	92	12	10	7	37	15.1
4	38	31.5	92	31	00	7	37	14.3
4	39	14.0	92	47	50	7	37	14.0
4	40	03.9	93	07	30	7	37	13.8
4	41	16.3	93	35	30	7	37	14.9
4	42	16.5	93	59	40	7	37	13.5
4	43	30 8	94	29	10	7	37	12.5
4	44	29.7	94	51	40	7	37	13.9

	h.	*min.*	*sec.*
Chronometer fast by 9 obs. of east star...........	7	37	14.13
Chronometer fast by 12 obs. of west star...........			14.28
Mean	7	37	14.20

APPENDIX No. 5—Continued.

September 10, 1846.—Camp 55, on the Rio del Norte, about one mile south of San Felippe.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	01	13.1	70	31	10	35	24	47 rej.
3	02	04.2	70	36	10	35	25	37
3	02	56.2	70	36	50	35	25	37
3	03	42.8	70	37	30	35	25	35
3	04	25.5	70	37	30	35	25	32
3	05	25.5	70	38	40	35	25	33
3	06	11.1	70	39	15	35	25	33
3	07	35.2	70	40	05	35	25	23
3	08	48.0	70	40	40	35	25	15

Thermometer 52°.

Mean of 8 observations, 35° 25′ 30″.

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APPENDIX No. 5—Continued.

September 10, 1846.—*Camp* 55.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Coronæ Borealis, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	13	37.8	89	47	05	7	36	06.6
3	16	43.0	89	20	50	7	36	07.3
3	17	34.9	88	59	40	7	36	07.1
3	18	28.7	88	37	45	7	36	06.7
3	19	30.7	88	12	50	7	36	08.6
3	20	37.4	87	44	45	7	36	05.3
3	21	27.0	87	24	15	7	36	04.6

Time, p. m.			Double altitudes of *a* Pegasi, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	47	10.1	78	32	10	7	36	03.4
3	48	00.0	78	51	30	7	36	05.2
3	48	37.5	79	14	20	7	36	05.7
3	50	07.5	79	42	10	7	36	06.3
3	51	04.2	80	05	50	7	36	05.8
3	51	44.5	80	21	20	7	36	05.4
3	52	48.5	80	46	50	7	36	05.4
3	53	49.8	81	11	05	7	36	05.4

Thermometer 52°.

	h.	*m.*	*s.*
Chronometer fast by 8 obs. of east star............	7	36	05.19
Chronometer fast by 7 obs. of west star			06.60
Mean......................	7	36	05.90

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APPENDIX No. 5—Continued.

September 13, 1846.—*Santa Fe.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	31	12.0	76	30	00	7	33	54.2
4	31	39.8	76	40	00	7	33	54.4
4	32	07.5	76	50	00	7	33	54.3
4	32	35.8	77	00	00	7	33	54.9
4	33	02.3	77	10	00	7	33	53.6
4	33	32.0	77	20	00	7	33	55.5
4	34	00.2	77	30	00	7	33	55.9
4	34	27.2	77	40	00	7	33	55.0
4	34	54.8	77	50	00	7	33	54.7
4	35	22.7	78	00	00	7	33	55.7
4	35	51.1	78	10	00	7	33	55.1
4	36	19.0	78	20	00	7	33	55.1
4	36	46.5	78	30	00	7	33	54.6

Thermometer 59°.

Mean of 13 observations, 7*h.* 33*m.* 54.78*s.*

DETERMINATION OF INDEX ERROR.

	Min.	*sec.*	*Min.*	*sec.*
On the arc..............................	31	20	31	40
Off the arc..............................	31	50	31	50

Index error = + 10″.

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APPENDIX No. 5—Continued.

September 13, 1846.—*Santa Fe.*

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
10	53	10.2	67	10	00	7	33	53.4
10	53	37.5	67	00	00	7	33	54.1
10	54	03.0	66	50	00	7	33	53.1
10	54	30.3	66	40	00	7	33	53.8
10	54	56.3	66	30	00	7	33	53.3
10	55	22.7	66	20	00	7	33	53.2
10	55	49.0	66	10	00	7	33	53.0
10	56	15.2	66	00	00	7	33	52.7
10	56	41.0	65	50	00	7	33	52.1
10	57	08.4	65	40	00	7	33	53.0
10	57	36.5	65	30	00	7	33	54.7
10	58	01.0	65	20	00	7	33	52.7
10	58	29.2	65	10	00	7	33	54.5

Thermometer 74°.

Mean of 13 observations, 7*h.* 33*m.* 53.50*s.*

APPENDIX No. 5—Continued.

September 17, 1846.—*Santa Fe.*

Time, a. m., Sept. 18.			Double altitudes of the sun's upper limb.		Time, p. m.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
4	48	02.0	80	20	10	09	13.0
4	47	32.8	80	10	10	09	42.6
4	47	02.0	80	00	10	10	11.0
4	46	34.0	79	50	10	10	42.0
4	46	04.2	79	40	10	11	10.2
4	45	36.0	79	30	10	11	39.5
4	45	06.8	79	20	10	12	09.4
			79	10	10	12	38.8
			79	00	10	13	07.5
Thermometer 68°.					Thermometer 72°.		

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APPENDIX No. 5—Continued.

September 17, 1846.—*Santa Fe.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	02	37.0	96	06	55	35	40	34
5	04	14.0	96	08	40	35	40	35
5	05	29.0	96	09	30	35	40	44
5	06	48.9	96	10	20	35	40	46
5	08	05.5	96	11	05	35	40	42
5	09	57.5	96	11	20	35	40	47
5	11	39.8	96	11	20	35	40	44
5	13	09.0	96	11	15	35	40	33
5	14	29.5	96	09	55	35	40	51
5	16	00.0	96	08	50	35	40	50
5	17	29.8	96	07	20	35	40	50
5	19	06.8	96	05	10	35	40	55

Thermometer 60°.

Mean of 12 observations, 35° 40′ 44″.

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APPENDIX No. 5—Continued.

September 17, 1846.—*Santa Fe.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	26	53.8	73	16	20	35	41	11
5	28	25.8	73	17	20	35	41	12
5	29	40.0	73	18	15	35	41	18
5	30	59.5	73	19	20	35	41	26
5	32	11.0	73	20	20	35	41	34
5	33	48.0	73	21	10	35	41	30
5	35	31.8	73	22	40	35	41	43
5	36	37.8	73	23	35	35	41	45
5	39	05.5	73	24	15	35	41	26
5	41	01.0	73	25	40	35	41	34

Thermometer 60°.

Mean of 9 observations, 35° 41′ 30″.

By North Star.						By South Star.					
	Deg.	*min.*	*sec.*				*Deg.*	*min.*	*sec.*		
Aug. 19..	35	41	13	7	obs.	Aug. 25..	35	40	32	15	obs.
" 20..	35	41	18	9	"	" 29..	35	41	01	11	"
" 29..	35	41	33	9	"	" 29..	35	40	57	14	"
Sept. 17..	35	41	30	9	"	Sept. 17..	35	40	44	12	"
Mean..	35	41	23.5			Mean..	35	40	48.5		

Mean of north, and south 35° 41′ 06″, latitude of Santa Fé.

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APPENDIX No. 5—Continued.

September 18, 1846.—*Santa Fe.*

Time, a. m.			Double altitudes of sun's upper limb.	
h.	*m.*	*s.*	*Deg.*	*min.*
4	45	06.8	79	20
4	45	36.0	79	30
4	46	04.2	79	40
4	46	34.0	79	50
4	47	02.0	80	00
4	47	32.8	80	10
4	48	02.0	80	20
4	48	30.5	80	30
4	49	00.5	80	40
4	49	30.0	80	50
4	49	58.0	81	00

Thermometer 68°.

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APPENDIX No. 5—Continued.

September 21, 1846.—*Santa Fe.*

DETERMINATION OF TIME.

Time, a. m.—Sept. 22.	Double altitudes of sun's upper limb.	Time, p. m.	Chronometer fast.
h. *m.* *s.*	*Deg.* *min.*	*h.* *m.* *s.*	*h.* *m.* *s.*
4 41 25.5	76 20	10 12 47.0	7 33 38.18
4 40 58.6	76 10	10 13 14.8	7 33 37.26
4 40 29.2	76 00	10 13 46.2	7 33 38.39
4 40 01.0	75 50	10 14 14.3	7 33 38.48
4 39 31.5	75 40	10 14 42.9	7 33 38.16
4 39 03.0	75 30	10 14 12.6	7 33 38.99
Thermom. 65.		Thermom. 74°.	

Mean of 6 observations, 7*h.* 33*m.* 38.24*s.*

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APPENDIX No. 5—Continued.

September 22, 1846.—*Santa Fe.*

Time, a. m.			Double altitudes of sun's upper limb.	
h.	*m.*	*s.*	*Deg.*	*min.*
4	38	38.8	75	20
4	39	03.0	75	30
4	39	31.5	75	40
4	40	01.0	75	50
4	40	29.2	76	00
4	40	58.6	76	10
4	41	28.5	76	20
4	41	59.5	76	30
4	42	27.5	76	40
4	42	57.0	76	50
Lost by clouds.			77	00

Thermometer 65°.

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APPENDIX No. 5—Continued.

September 23, 1846.—*Santa Fe.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
5	03	21.8	119	03	15	7	33	35.7	
5	04	29.0	119	30	35	7	33	35.6	
5	05	29.0	119	54	40	7	33	36.3	
5	06	36.8	120	22	45	7	33	34.9	
5	07	27.0	120	42	10	7	33	37.2	
5	08	10.8	121	04	05	7	33	36.0	
5	09	11.0	121	22	10	7	33	42.6	rej.
5	09	54.1	121	41	25	7	33	38.2	
5	10	36.3	121	58	55	7	33	37.2	
5	11	36.5	122	23	50	7	33	36.0	

Thermometer 62°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h*	*m.*	*s.*	
5	14	47.5	101	07	00	7	33	37.3	
5	15	44.0	100	43	50	7	33	33.4	rej.
5	16	32.8	100	26	20	7	33	36.5	
5	17	20.5	100	07	30	7	33	34.9	
5	18	10.5	99	48	20	7	33	34.9	
5	19	01.8	99	27	55	7	33	32.8	rej.
5	19	51.0	99	10	05	7	33	35.4	
5	20	52.8	98	46	20	7	33	35.0	
6	21	49.5	98	25	20	7	33	36.1	

Thermometer 62°.

	h.	*m.*	*s.*
Chronometer fast by 9 obs. of east star............	7	33	36.34
Chronometer fast by 7 obs. of west star			35.81
Mean...........................	7	33	36.08

APPENDIX No. 5—Continued.

September 30, 1846.—Camp 62, seven miles below Isolett, west bank Rio del Norte.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Antares from moon's western limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	04	20.8	67	11	30	7	08	40.9
3	06	18.6	67	12	15	7	09	06.1
3	11	05.8	67	13	20	7	06	41.4
3	14	13.5	67	14	20	7	07	41.3
3	16	04.2	67	14	50	7	07	25.4
3	18	14.5	67	15	40	7	07	53.7
3	20	08.5	67	16	30	7	08	37.8
3	21	48.5	67	17	05	7	08	47.2

Thermometer 48°.

Time, p. m.			Distance of *a* Pegasi from moon's western limb.			Longitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	36	07.5	38	56	10	7	04	55.2
3	38	19.2	38	55	00	7	05	44.7
3	39	58.8	38	54	30	7	05	21.3
3	43	32.0	38	53	20	7	04	52.6
3	44	47.5	38	52	30	7	05	44.7
3	49	21.8	38	50	55	7	05	21.3
3	50	53.0	38	50	25	7	05	05.6
3	53	04.0	38	49	40	7	04	50.0

Thermometer 48°.

	h.	*m.*	*s.*
Longitude by 8 observations of Antares	7	08	07.10
Longitude by 8 observations of *a* Pegasi........		05	14.42
Mean........................	7	06	40.76

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APPENDIX No. 5—Continued.

September 30, 1846.—*Camp* 62.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	06	17.5	105	51	05	7	36	24.0
4	07	04.8	106	10	45	7	36	23.5
4	07	54.0	106	31	35	7	36	22.0
4	08	47.6	106	54	05	7	36	20.8
4	09	30.0	107	10	30	7	36	23.4
4	10	23.8	107	33	05	7	36	21.3
4	11	21.9	107	56	25	7	36	25.6

Thermometer 48°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	25	41.8	109	55	15	7	36	25.7
4	26	44.0	109	31	25	7	36	25.2
4	27	28.8	109	13	50	7	36	24.7
4	28	12.0	108	57	00	7	36	21.5
4	28	55.8	108	40	10	7	36	22.9
4	29	45.0	108	20	50	7	36	21.2
4	30	39.0	107	59	55	7	36	23.4

Thermometer 48°.

	h.	*m.*	*s.*
Chronometer fast by 7 observations of east star..	7	36	22.66
Chronometer fast by 7 observations of west star..			24.37
Mean......................	7	36	23.52

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APPENDIX No. 5—Continued.

September 30, 1846.—*Camp* 62.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	35	38.0	71	29	50	34	48	28
4	42	11.0	71	34	00	34	48	34
4	43	09.0	71	34	40	34	48	36
4	44	10.0	71	35	20	34	48	37
4	44	46.0	71	35	40	34	48	34
4	45	18.5	71	36	05	34	48	36
4	46	16.8	71	36	35	34	48	34
4	47	21.5	71	36	55	34	48	24

Thermometer 48°.

Mean of 8 observations, 34° 48′ 33″.

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APPENDIX No. 5—Continued.

October 4, 1846.—Lamp 65, west bank Ric del Norte, about two miles below Linitans.

LUNAR DISTANCE.

Time, p. m.			Fomalhaut and moon's western limb.			Double altitude of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	04	09.8	47	15	50	66	37	10
4	06	01.8	47	15	50	67	20	40
4	07	09.2	47	16	35	67	46	20
4	08	53.8	47	17	10	68	27	00
4	11	57.5	47	18	45	69	38	40
4	13	40.0	47	19	10	70	18	50
4	15	32.0	47	20	05	71	01	30
4	17	08.0	47	20	35	71	38	30

Time, p. m.			Aldebaran and moon's western limb.			Double altitude of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	28	56.5	51	59	05	76	09	40
4	31	05.0	51	58	40	76	58	40
4	32	46.0	51	57	45	77	36	10
4	34	43.0	51	56	30	78	19	50
4	36	58.0	51	56	10	79	10	30
4	38	35.0	51	55	35	79	47	50
4	40	27.0	51	54	55	80	38	50
4	41	41.5	51	54	10	80	57	00
4	43	13.0	51	53	40	81	31	30

Thermometer 60°.

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APPENDIX No. 5—Continued.

October 4, 1846.—Camp 65, west bank of the Rio del Norte.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
2	22	50.5	68	42	50	34	07	27
2	24	00.0	68	44	00	34	07	34
2	24	50.0	68	44	55	34	07	42
2	26	07.8	68	45	55	34	07	40
2	27	14.2	68	46	50	34	07	42
2	28	16.2	68	47	45	34	07	45
2	28	58.0	68	48	20	34	07	46
2	30	09.8	68	49	10	34	07	47
2	30	58.7	68	49	50	34	07	44
2	31	36.5	68	50	10	34	07	39
2	32	19.8	68	50	35	34	07	34
2	33	09.0	68	51	10	34	07	32

Thermometer 64°.

Mean of 12 observations, 34° 07′ 59″.

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APPENDIX No. 5—Continued.

October 4, 1846.—Camp 65, west bank of the Rio del Norte.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	01	27.9	85	21	25	7	36	51.0	
3	02	21.8	85	43	50	7	36	49.7	
3	03	01.2	85	58	30	7	36	53.8	rej.
3	03	54.0	86	21	15	7	36	51.1	
3	04	42.5	86	41	25	7	36	50.5	
3	07	23.0	87	45	45	7	36	50.2	
3	08	23.0	88	12	05	7	36	50.1	
3	09	10.5	88	31	50	7	36	49.6	
3	09	45.8	88	46	20	7	36	49.5	
3	10	31.5	89	04	50	7	36	50.1	

Thermometer 62°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	46	00.0	118	58	50	7	36	52.2
3	46	58.8	118	35	35	7	36	51.3
3	47	59.0	118	12	50	7	36	53.5
3	48	57.5	117	49	50	7	36	53.1
3	49	43.8	117	32	25	7	36	54.7
3	50	31.7	117	12	30	7	36	51.7
3	51	14.8	116	56	25	7	36	53.6
3	52	09.8	116	34	45	7	36	53.1

Thermometer 62°.

	h.	*m.*	*s.*
Chronometer fast by 9 obs. of east star	7	36	50.20
" 18 " west star			52.90
Mean	7	36	51.56

APPENDIX No. 5—Continued.

October 5, 1846—Camp 66, near Socorro.

Time, p. m.			Double altitudes of *a* Andromedæ.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
3	36	56.2	101	37	30
3	38	15.8	102	10	10
3	38	58.7	102	28	25
3	39	47.5	102	38	25
3	40	46.8	103	13	10
3	41	30.0	103	31	05
3	42	05.5	103	46	50

Time, p. m.			Double altitudes of *a* Lyræ, in the west.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
3	46	28.0	117	10	35
3	47	29.7	116	47	00
3	48	22.0	116	26	05
3	49	19.5	116	04	00
3	50	12.8	115	43	35
3	51	10.1	115	22	10
3	51	58.5	115	02	40

Thermometer 58°.

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APPENDIX No. 5—Continued.

October 7, 1846.—Camp 68, west bank of the Rio del Norte.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	38	30.5	130	21	55	7	37	02.3
4	39	38.2	130	50	05	7	37	02.2
4	40	37.8	131	14	15	7	37	03.6
4	41	30.5	131	36	30	7	37	02.7
4	42	27.0	132	00	20	7	37	01.8
4	43	11.5	132	19	10	7	37	01.3
4	43	55.7	132	37	05	7	37	01.9

Thermometer 62°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	47	29.0	90	21	10	7	37	06.4
4	48	06.0	90	06	40	7	37	05.6
4	49	02.0	89	45	25	7	37	06.0
4	49	51.8	89	26	05	7	37	05.5
4	50	38.7	89	08	50	7	37	07.2
4	51	37.8	88	45	50	7	37	06.2
4	52	31.4	88	24	55	7	37	05.2
4	53	20.0	88	06	00	7	34	04.2
4	54	06.0	87	49	00	7	37	05.8

Thermometer 62°.

	h.	*m.*	*s.*
Chronometer fast by 7 obs. of east star...........	7	37	02.26
Chronometer fast by 9 obs. of west star..........			05.79
Mean	7	37	04.02

APPENDIX No. 5—Continued.

October 7, 1846.—Camp 68, west bank of the Rio del Norte.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	20	51.02	69	53	45	33	41	04 rej.
5	22	12.8	69	54	45	33	41	16
5	23	18.0	69	55	10	33	41	16
5	23	46.0	69	55	30	33	41	20
5	24	37.0	69	55	50	33	41	20
5	25	26.0	69	56	10	33	41	18
5	26	03.5	69	56	35	33	41	22
5	26	45.0	69	56	50	33	41	21
5	27	24.0	69	57	05	33	41	20
5	28	09.5	69	57	20	33	41	18

Mean of 9 observations, 33° 41′ 19″.

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APPENDIX No. 5—Continued.

October 10, 1846.—*Camp* 70.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	34	46.0	100	46	50	35	19	19
3	35	56.5	100	48	00	33	19	45
3	37	15.5	100	49	55	33	19	36
3	38	38.2	100	51	10	33	19	41
3	39	49.0	100	51	30	33	19	50
3	40	57.05	100	53	10	33	19	28
3	41	57.5	100	54	10	33	19	10
3	43	12.8	100	54	35	33	19	05
3	45	12.5	100	53	50	33	19	24
3	46	15.0	100	53	05	33	19	36
3	47	02.0	100	52	20	33	19	47
3	47	51.2	100	51	50	33	19	45
3	48	58.8	100	51	10	33	19	41
3	50	19.0	100	49	40	33	19	45
3	51	55.2	100	47	40	33	19	45
3	52	54.5	100	46	20	33	19	42
3	54	32.8	100	42	40	33	19	68

Thermometer 48°.

Mean of 17 observations, 33° 19′ 38″.

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APPENDIX No. 5—Continued.

Ooctober 10, 1846.—*Camp* 70.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	02	30.2	68	36	35	33	20	15
4	03	47.0	68	37	50	33	20	29
4	05	11.2	68	38	05	33	20	11
4	05	54.5	68	38	50	33	20	19
4	06	44.0	68	39	55	33	20	37
4	07	31.3	68	40	10	33	20	30
4	08	19.2	68	40	40	33	20	30
4	09	12.5	68	41	10	33	20	28
4	09	43.5	68	41	25	33	20	26
4	10	34.0	68	41	50	33	20	24
4	11	15.5	68	42	30	33	20	31
4	12	08.5	68	43	10	33	20	36
4	13	03.0	68	43	00	33	20	14
4	14	05.0	68	44	00	33	20	25
4	14	45.8	68	44	20	33	20	24
4	15	20.8	68	44	35	33	20	21
4	15	56.8	68	44	50	33	20	19

	Latitude of camp.		
	Deg.	*min.*	*sec.*
Latitude by 17 observations of *b* Aquarii.......	33	19	38
" " " Polaris.........	33	20	25
Mean.....................	33	20	02

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APPENDIX No. 5—Continued.

October 10, 1846.—*Camp* 70, *east side of the Rio del Norte.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of sun's upper limb.		Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*
5	01	7.5	75	30	7	37	42.5
5	01	39.2	75	40	7	37	41.9
5	02	12.8	75	50	7	37	42.6
5	02	45.0	76	00	7	37	42.0
5	03	18.0	76	10	7	37	42.0
5	03	51.8	76	20	7	37	42.8
5	04	23.5	76	30	7	37	42.5
5	04	56.9	76	40	7	37	41.8
5	05	30.5	76	50	7	37	42.2
5	06	03.0	77	00	7	37	41.5

Thermometer 68°.

Mean of 10 observations, 7*h.* 37*m.* 42.18*s.*

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APPENDIX No. 5—Continued.

October 10, 1846.—*Camp* 70.

DETERMINATION OF TIME.

Equal altitudes of sun.

Time, a. m.—Oct. 11.			Double altitudes of sun's upper limb.		Time, p. m.—Oct. 10.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*
4	57	49.3	74	00	9	52	44.5	7	37	37.67
4	57	18.2	73	50	9	53	16.0	7	37	38.07
4	56	45.0	73	40	9	53	49.0	7	37	38.16
4	56	12.5	73	30	9	54	20.8	7	37	38.00
4	55	41.5	73	20	9	54	51.0	7	37	37.79
4	55	09.2	73	10	9	55	25.5	7	37	38.07
4	54	37.3	73	00	9	55	56.0	7	37	38.55
4	54	04.7	72	50	9	56	26.3	7	37	37.59
4	53	33.5	72	40	9	56	59.0	7	37	38.50
4	53	01.0	72	30	9	57	30.0	7	37	37.90
4	52	28.8	72	20	9	58	01.2	7	37	37.63
4	51	25.3	72	00	9	59	04.5	7	37	37.87

Mean of 12 observations, 7*h.* 37*m.* 37.99*s.*

DETERMINATION OF INDEX ERROR.

	Min.	*sec.*
On the arc..............................	31	30
Off the arc..............................	31	50

Index error = + 10″.

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APPENDIX No. 5—Continued.

October 11, 1846.—*Camp* 70.

DETERMINATION OF TIME.

Equal altitudes of the sun.

Time, a. m.			Double altitudes of sun's upper limb.		Time, p. m.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*	
4	51	25.3	72	00	9	56	54.5	7	37	35.60	
4	51	57.0	72	10	9	56	21.7	7	37	35.05	
4	52	28.8	72	20	9	55	50.3	7	37	35.25	
4	53	01.0	72	30	9	55	19.0	7	37	35.70	
4	53	33.5	72	40	9	54	46.0	7	37	35.45	
4	54	04.7	72	50	9	54	18.8	7	37	37.45	rej.
4	54	37.3	73	00	9	53	43.0	7	37	35.85	
4	55	09.2	73	10	9	53	09.0	7	37	34.80	
4	55	41.5	73	20	9	52	38.5	7	37	35.70	
4	56	12.5	73	30	9	52	05.8	7	37	34.85	
4	56	45.0	73	40							
4	57	18.2	73	50							
4	57	49.3	74	00							
Ther. 60°.					Ther. 80°.						

Mean of 9 observations, 7*h.* 37*m.* 55.36*s.*

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APPENDIX No. 5—Continued.

October 12, 1846.—*Camp* 70.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	07	55.0	100	34	25	7	37	29.1
3	09	03.8	101	01	50	7	37	32.1 rej.
3	10	07.5	101	30	10	7	37	27.8
3	11	07.8	101	55	40	7	37	27.0
3	12	08.2	102	19	25	7	37	30.4 rej.
3	13	31.2	102	55	30	7	37	26.9
3	14	29.8	103	20	10	7	37	26.4
3	15	43.8	103	50	05	7	37	28.7
3	16	40.5	104	14	00	7	37	28.2
3	17	27.2	104	33	10	7	37	28.9

Thermometer 42°.

Time, p. m.			Double altitudes of *à* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	21	45.0	115	52	10	7	37	31.9
3	22	26.8	115	35	40	7	37	31.5
3	23	06.0	115	20	30	7	37	31.9
3	23	49.8	115	03	20	7	37	31.7
3	24	40.2	114	43	30	7	37	31.3
3	25	27.8	114	24	50	7	37	31.2
3	26	15.8	114	06	10	7	37	32.5
3	27	02.0	113	48	20	7	37	31.9
3	28	05.5	113	22	50	7	37	30.2

Thermometer 42°.

	h.	*min.*	*sec.*
Chronometer fast by 8 obs. of east star............	7	37	27.88
Chronometer fast by 9 obs. of west star............	7	37	31.57
Mean........................	7	37	29.72

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APPENDIX No. 5.—Continued.

October 13, 1846.—*Camp* 70.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
3	46	40.8	104	32	30
3	47	47.3	104	07	30
3	48	49.0	103	43	40
3	49	51.2	103	20	20
3	50	36.5	103	01	50
3	51	40.5	102	37	10

Thermometer 42°.

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APPENDIX No. 5—Continued.

October 13, 1846.—*Camp* 71, *west side of the Rio del Norte.*

Time, p. m.			Double altitudes of *a* Andromedæ.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
3	37	49.1	114	46	00
3	39	17.5	115	23	10
3	40	14.0	115	45	45
3	41	17.3	116	12	30
3	42	08.0	116	34	15
3	42	57.8	116	54	40

Thermometer 42°.

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APPENDIX No. 5—Continued.

October 15, 1846.—*Camp* 73, *on a small stream—first camp after leaving the Del Norte.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	57	13.2	108	39	15	8	19	06.7	
3	58	20.8	109	08	15	8	19	05.2	
3	59	04.2	109	27	10	8	19	03.6	rej.
3	59	45.7	109	44	00	8	19	05.0	
4	00	32.5	110	03	30	8	19	05.4	
4	01	20.7	110	23	05	8	19	07.8	
4	01	58.5	110	38	40	8	19	07.7	

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	22	34.5	103	28	35	8	19	10.6
4	23	35.0	103	04	40	8	19	09.6
4	24	41.2	102	38	40	8	19	08.9
4	25	24.5	102	22	20	8	19	10.2
4	26	19.5	102	01	20	8	19	11.2
4	26	57.1	101	47	05	8	19	12.1
4	27	47.6	101	27	45	8	19	12.3

Thermometer 66°.

	h.	*m.*	*s.*
Chronometer fast by 6 observations of east star...	8	19	06.30
" 7 " west star...	8	19	10.70
Mean........................	8	19	08.50

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APPENDIX No. 5—Continued.

October 15, 1846.—*Camp* 73.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	07	21.8	67	34	40	32	54	37 rej.
4	08	05.2	67	35	40	32	54	53
4	08	57.5	67	36	20	32	54	56
4	09	33.5	67	36	50	32	54	59
4	10	30.0	67	37	45	32	55	08
4	11	25.8	67	38	10	32	55	04
4	12	26.5	67	39	15	32	55	15
4	13	50.0	67	39	55	32	55	10
4	14	30.0	67	40	10	32	55	04

Mean of 8 observations, 32° 35′ 04″.

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APPENDIX No. 5—Continued.

October 17, 1846.—*Camp* 75.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	35	11.8	99	49	50	8	25	53.9
3	36	11.8	100	14	55	8	25	54.0
3	36	58.0	100	35	10	8	25	51.8
3	37	49.5	100	56	10	8	25	53.2
3	38	38.5	101	16	40	8	25	53.4
3	39	30.0	101	38	15	8	25	53.3
3	40	13.5	101	55	50	8	25	54.9

Thermometer 38°.

Time, p. m.			Double altitudes of *a* Lyræ in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	45	10.2	117	29	55	8	25	57.8
3	46	15.2	117	03	30	8	25	55.3
3	47	06.8	116	43	50	8	25	56.6
3	47	56.2	116	24	20	8	25	56.2
3	48	56.2	116	00	25	8	25	54.9
3	49	47.8	115	40	25	8	25	55.4
3	51	16.0	115	06	25	8	25	56.8

	h.	*m.*	*s.*
Chronometer fast by 7 obs. of east star...........	8	25	53.50
Chronometer fast by 7 obs. of west star	8	25	56.14
Mean......................	8	25	54.82

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APPENDIX No. 5—Continued.

October 17, 1846.—*Camp* 75.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	57	57.0	102	04	40	32	42	18
3	59	04.0	102	05	50	32	42	08
4	00	13.0	102	07	00	32	42	03
4	01	40.0	102	07	50	32	42	05
4	02	54.4	102	08	30	32	41	59
4	03	56,0	102	08	05	32	42	18
4	05	00.0	102	08	10	32	42	16
4	06	16.5	102	07	55	32	42	15
4	07	22.0	102	07	40	32	42	10
4	08	17.0	102	07	25	32	42	02
4	09	33.0	102	06	35	32	41	58
4	10	46.5	102	04	50	32	42	15
4	11	44.0	103	03	25	32	42	22

Thermometer 38°

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	16	53.8	67	16	30	32	42	09
4	18	04.0	67	16	50	32	41	58
4	18	47.2	67	17	50	32	42	15
4	19	45.0	67	18	30	32	42	17
4	20	57.8	67	18	50	32	42	03
4	21	50.0	67	19	25	32	42	05
4	22	36.0	67	20	20	32	42	18
4	23	10.5	67	20	40	32	42	17
4	23	42.0	67	21	15	32	42	26

Thermometer 38°.

	Latitude of camp.		
	Deg.	*min.*	*sec.*
Latitude by 13 obs. of *b* Aquarii	32	42	10
Latitude by 9 obs. of Polaris.......................	32	42	12
Mean	32	42	11

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APPENDIX No. 5—Continued.

October 19, 1846.—*Camp* 77.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
5	10	51.3	82	39	10	8	28	01.6
5	11	42.0	81	50	00	8	28	02.0
5	12	29.9	81	32	10	8	28	03.0
5	13	20.8	81	13	10	8	28	04.1
5	14	03.0	80	56	40	8	28	02.9
5	15	06.8	80	32	40	8	28	03.7
5	16	16.0	80	05	55	8	28	02.6

Thermometer 50°.

Mean of 7 observations, 8*h.* 28*m.* 02.84*s.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	20	51.8	68	11	20	32	50	31
5	21	48.0	68	12	20	32	50	46
5	22	49.5	68	12	40	32	50	40
5	23	34.2	68	13	30	32	50	55
5	24	12.0	68	14	00	32	50	61
5	25	43.8	68	14	40	32	50	59
5	26	27.5	68	15	20	32	50	70
5	27	15.0	68	15	30	32	50	66
5	28	51.0	68	15	40	32	50	55

Thermometer 50°.

Mean of 9 observations, 32° 50′ 54″.

APPENDIX No. 5—Continued.

October 20, 1846.—*Camp* 78, *on the Rio Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	50	18.0	101	48	50	32	49	48
3	51	05.8	101	49	40	32	49	50
3	52	01.0	101	50	30	32	49	53
3	52	49.7	101	50	45	32	50	07
3	53	41.0	101	51	50	32	49	52
3	54	28.0	101	51	55	32	50	02
3	55	19.8	101	52	20	32	50	01
3	56	23.0	101	52	50	32	49	54
3	57	25.8	101	52	55	32	49	53
3	58	02.8	101	52	40	32	50	00
3	59	20.8	101	51	50	32	50	16
4	00	15.5	101	51	20	32	50	19
4	01	22.0	101	50	50	32	50	14
4	02	28.2	101	50	20	32	50	03
4	03	06.5	101	49	50	32	50	00
4	04	19.2	101	48	10	32	50	09

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	28	08.0	67	43	20	32	50	01
4	29	05.5	67	44	10	32	50	05
4	29	38.0	67	44	50	32	50	15
4	30	16.8	67	45	20	32	50	21
4	31	07.0	67	45	40	32	50	16
4	31	52.1	67	46	15	32	50	21
4	32	34.0	67	46	30	32	50	15
4	33	12.8	67	46	55	32	50	16
4	33	47.0	67	47	20	32	50	18

Thermometer 50°.

	Deg.	*min.*	*sec.*	
Latitude by 16 observations of *b* Aquarii,	32	50	01	
Latitude by 9 observations of Polaris,	32	50	14	
Mean	32	50	08	lat. of camp.

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APPENDIX No. 5—Continued.

October 20, 1846.—*Camp* 78.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	10	38.3	117	46	30	8	30	29.2
4	11	39.0	118	11	55	8	30	29.6
4	12	25.7	118	31	35	8	30	29.6
4	13	15.0	118	52	35	8	30	29.0
4	14	11.2	119	15	55	8	30	29.8
4	15	04.0	119	39	00	8	30	27.8
4	15	53.0	119	59	40	8	30	27.7

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Lyræ in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	19	33.8	101	20	05	8	30	29.2
4	20	17.8	101	04	10	8	30	32.2
4	21	00.8	100	47	30	8	30	32.2
4	21	49.7	100	28	20	8	30	31.8
4	22	38.0	100	08	55	8	30	30.0
4	23	17.8	99	53	10	8	30	29.4
4	24	04.0	99	35	35	8	30	30.2

Thermometer 50°.

	h.	*min.*	*sec.*
Chronometer fast by 7 obs. of east star..........	8	30	28.96
Chronometer fast by 7 obs. of west star..........	8	30	30.71
Mean	8	30	29.83

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APPENDIX No. 5—Continued.

October 24, 1846.—*Camp* 81, *on the Gila.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Fomalhaut, from moon's western limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
2	32	14.8			
2	34	03.6	67	42	20
2	35	16.8	67	42	15
2	37	04.5	67	41	45
2	38	39.0	67	40	55
2	39	57.8	67	40	30
2	41	12.5	67	40	05
2	42	38.5	67	39	55
2	44	02.0	67	39	10
2	46	01.0	67	38	20
2	47	17.0	67	37	40
2	48	35.8	67	37	10
2	50	04.0	67	36	50

Thermometer 68°.

Longitude by mean of observations, 7*h.* 12*m.* 17.4*s.*

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APPENDIX No. 5—Continued.

October 24, 1846.—Camp 81, on the Gila.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	13	24.8	98	23	55	8	35	05.6
3	14	25.2	98	50	00	8	35	05.8
3	15	15.5	99	10	50	8	35	04.3
3	16	04.7	99	31	30	8	35	04.1
3	16	50.6	99	51	30	8	35	02.2
3	17	41.0	100	11	50	8	35	04.1
3	18	38.0	100	36	15	8	35	03.6
3	19	33.0	100	58	10	8	35	04.3
3	20	17.5	101	17	35	8	35	03.7

Thermometer 54°.

Time, p. m.			Double altitudes of *a* Lyræ in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	23	15.0	118	53	55	8	35	04.5
3	24	01.2	118	37	20	8	35	08.3 rej.
3	24	54.0	118	15	10	8	35	04.5
3	25	34.0	117	59	50	8	35	05.3
3	26	15.5	117	43	20	8	35	04.7
3	26	59.8	117	25	50	8	35	04.3
3	27	40.8	117	09	30	8	35	03.4
3	28	24.0	116	52	30	8	35	05.4
3	29	08.0	116	35	30	8	35	03.7

	h.	*m.*	*s.*
Chronometer fast by 9 observations of east star....	8	35	03.97
Chronometer fast by 8 observations of west star...	8	35	04.48
Mean..........................	8	35	04.22

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APPENDIX No. 5—Continued.

October 24, 1846.—*Camp* 81, *on the Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*	
3	34	52.0	101	51	50	32	45	03	
3	35	59.5	101	53	50	32	44	56	
3	37	17.9	101	55	50	32	45	01	
3	38	51.8	101	57	30	32	45	17	rej.
3	40	02.5	102	00	20	32	44	31	
3	41	12.0	102	00	40	32	44	57	
3	42	21.2	102	02	25	32	44	31	
3	43	45.0	103	03	20	32	44	26	
3	45	10.8	102	03	15	32	44	41	
3	46	30.0	102	03	40	32	44	31	
3	47	36.0	102	04	00	32	44	16	
3	48	22.8	102	03	10	32	44	34	
3	49	13.2	102	03	10	32	44	22	
3	50	06.8	102	02	20	32	44	31	
3	51	14.2	102	01	40	32	44	28	
3	52	10.0	102	00	55	32	44	20	
3	53	07.0	102	00	15	32	44	08	rej.
3	54	18.8	101	58	10	32	44	24	
3	55	37.6	101	55	25	32	44	45	
3	57	13.5	101	52	40	32	44	43	

Mean of 18 observations, 32° 44′ 37″.

Latitude by 12 obs. of Polaris.........	32	45	06	
Latitude by 18 obs. of *b* Aquarii.......	32	44	37	
Mean of north and south stars...	32	44	52	lat. of camp.

APPENDIX No. 5—Continued.

October 24, 1846.—*Camp* 81, *on the Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
2	56	31.0	66	39	20	32	45	14
2	57	30.5	66	40	20	32	45	14
2	58	18.8	66	40	45	32	45	01
2	58	58.5	66	41	10	32	44	57
2	59	39.2	66	42	00	32	45	06
3	00	34.5	66	42	45	32	45	09
3	01	24.0	66	43	15	32	45	07
3	02	21.5	66	44	10	32	45	13
3	03	18.8	66	44	55	32	45	15
3	03	58.8	66	45	20	32	45	12
3	04	57.0	66	45	50	32	45	08
3	05	55.6	66	46	20	32	44	59

Thermometer 62°.

Mean of 12 observations, 32° 45′ 06″.

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APPENDIX No. 5—Continued.

October 26, 1846.—Camp 83, on the Gila.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Pegasi from moon's western limb.			Double altitudes of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	14	49.0	56	00	10	63	59	20
4	16	28.2	55	59	10	63	14	40
4	18	20.8	55	58	30	62	47	00
4	19	43.5	55	58	10	62	26	10
4	22	33.0	55	57	30	61	43	55
4	24	11.8	55	57	10	61	19	20

Thermometer 66°.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of ——— in the west.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
5	19	35.8	96	03	40
5	20	24.0	95	46	20

Time, p m.			Double altitudes of *a* Lyræ in the west.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
5	25	51.0	70	07	10

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APPENDIX No. 5—Continued.

October 27, 1846.—Camp 83, on the Gila.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
2	40	42.0	66	50	10	32	55	11
2	41	27.8	66	50	50	32	55	15
2	42	29.2	66	51	35	32	53	15
2	44	02.0	66	52	50	32	53	18
2	45	15.3	66	53	40	32	53	12
2	46	10.8	66	54	30	32	53	17
2	46	58.5	66	55	10	32	53	20
2	47	46.7	66	55	45	32	53	19
2	48	28.8	66	56	10	32	53	16

Thermometer 51°.

Mean of 10 observations, 52° 55′ 16″.

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APPENDIX No. 5—Continued.

October 27, 1846.—Camp 83, on the Gila.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	54	45.6	94	11	05	8	38	24.3
2	55	30.5	94	29	00	8	38	26.3
2	56	16.7	94	48	05	8	38	26.8
2	57	08.5	95	09	05	8	38	28.1
2	57	50.4	95	27	10	8	38	26.8
2	58	36.8	95	47	25	8	38	24.8
2	59	57.8	96	11	45	8	38	26.4
3	00	22.0	96	30	10	8	38	27.6
3	01	08.2	96	49	55	9	38	26.5

Thermometer 51°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	28	13.0	113	46	20	8	38	28.4
3	29	20.2	113	20	05	8	38	28.6
3	30	12.0	112	59	55	8	38	28.8
3	31	21.0	112	33	05	8	38	29.2
3	32	22.0	112	09	05	8	38	28.8
3	33	11.0	111	48	40	8	38	25.0 rej.
3	33	55.8	111	32	10	8	38	28.0
3	34	45.0	111	13	05	8	38	28.4
3	35	33.0	110	54	10	8	38	28.0

Thermometer 51°.

Mean of 17 observations, 8*h.* 58*m.* 27.46*s.*

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APPENDIX No. 5—Continued.

October 27, 1846.—*Camp* 83, *on the Gila.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Pegasi from moon's western limb.			Double altitude of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	46	05.5	42	43	40	74	31	50
4	47	41.0	42	42	50	74	10	10
4	49	05.5	42	42	30	73	51	40
4	50	53.0	42	42	00	73	27	40
4	54	56.0	42	40	30	72	31	10
4	56	52.5	42	39	35	72	04	40
4	58	31.8	42	38	50	71	40	00
5	00	28.3	42	38	20	71	13	10
5	02	42.0	42	37	20	70	41	00
5	04	09.2	42	37	10	70	19	20
5	05	59.5	42	36	35	69	52	15

Thermometer 50°.

Longitude, by mean of observations, 7*h.* 13*m.* 04.24*s.*

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APPENDIX No. 5—Continued.

October 30, 1846.—*Camp* 86, *on the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of —— in the east.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
8	26	01.0	98	19	05
8	26	50.0	98	38	10
8	28	23.0	99	14	50

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
8	34	30.5	69	14	50	33	12	05
8	35	46.0	69	14	30	33	12	05
8	36	51.2	69	14	30	33	12	14
8	37	37.8	69	14	10	33	12	11
8	39	01.8	69	15	50	33	12	13
8	40	03.5	69	13	20	33	12	16
8	41	19.0	69	13	05	33	12	11
8	42	55.0	69	12	35	33	12	13
8	44	29.0	69	11	40	33	12	01
8	45	40.5	69	11	20	33	12	04
8	46	27.0	69	11	15	33	12	10
8	47	26.8	69	11	05	33	12	15
8	48	22.7	69	10	45	33	12	17

Thermometer 55°.

Mean of 13 observations, 33° 12′ 10″.

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APPENDIX No. 5—Continued.

October 30, 1846.—*Camp* 86, *on the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Aldebaran, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
8	55	13.8	124	55	50	8	41	02.9
8	56	14.5	125	16	35	8	41	04.9
8	57	24.0	125	41	05	8	41	04.9
8	58	26.8	126	03	30	8	41	03.7
Clouds.								
9	00	44.8	126	51	15	8	41	04.7
9	01	54.0	127	15	15	8	41	04.5
9	03	32.8	127	48	55	8	41	05.1
9	05	35.8	128	31	10	8	41	04.2
9	06	41 9	128	53	15	8	41	05.0

Thermometer 55°.

Mean of 9 observations, 8*h.* 41*m.* 04.43*s.*

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APPENDIX No. 5—Continued.

October 30, 1846.—*Camp* 86, *on the Gila.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Aldebaran from moon's western limb.			Double altitudes of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
9	23	27.0	72	07	35	58	47	40
9	25	06.0	72	06	50	58	10	50
9	27	55.8	72	05	35	57	06	30
9	30	03.5	72	04	25	56	18	00
9	31	55.8	72	03	25	55	36	10
9	33	36.0	72	02	40	54	58	20
9	35	27 8	72	01	40	54	15	30
9	37	40.8	72	00	25	53	24	50
9	39	28.8	71	59	30	52	43	20

Thermometer 50°.

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APPENDIX No. 5—Continued.

October 31, 1846.—*Camp* 87, *on the San Francisco, about two miles from its mouth.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*	
3	17	31.8	100	58	50	33	14	29	
3	18	38.7	101	01	00	33	14	04	rej.
3	19	28.5	101	01	20	33	14	19	
3	20	33.5	101	02	05	33	14	25	
3	21	45.0	101	02	50	33	14	26	
3	22	50.9	101	03	30	33	14	22	
3	24	00.7	101	03	45	33	14	25	
3	25	54.2	101	04	10	33	14	13	
3	27	13.7	101	04	30	33	13	53	rej.
3	28	28.0	101	03	10	33	14	15	
3	29	51.5	101	02	10	33	14	16	
3	31	00.0	101	01	00	33	14	20	
3	32	14.2	100	59	45	33	14	16	
3	33	31.5	100	57	40	33	14	27	

Thermometer 50°.

Mean of 12 observations, 33° 14′ 21″.

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APPENDIX No. 5—Continued.

October 31, 1846.—*Camp* 87.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Andromedæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	40	05.0	118	29	40	8	41	31.2
3	41	18.2	119	01	00	8	41	29.7
3	42	04.2	119	20	00	8	41	30.4
3	43	12.5	119	49	10	8	41	29.2
3	44	13.0	120	13	25	8	41	31.9
3	45	10.8	120	38	20	8	41	30.3
3	46	06.0	121	01	30	8	41	30.3
3	47	01.0	121	24	55	8	41	29.4
3	48	05.8	121	51	40	8	41	30.5

Thermometer 50°.

Time, p. m.			Double altitudes of α Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	57	51.0	97	34	30	8	41	32.8
3	58	41.8	97	14	50	8	41	32.8
3	59	29.0	96	56	35	8	41	32.9
4	00	12.8	96	39	50	8	41	33.2
4	01	10.7	96	17	25	8	41	33.1
4	02	24.0	95	49	30	8	41	34.2
4	03	13.3	95	30	05	8	41	33.2
4	03	52.0	95	15	10	8	41	33.2
4	04	46.9	94	54	10	8	41	33.7
4	05	25.5	94	39	10	8	41	33.4
4	06	18.0	94	18	30	8	41	32.4

Thermometer 50°.

Mean of 20 observations, 8*h.* 41*m.* 54.75*s.*

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APPENDIX No. 5—Continued.

October 31, 1846.—*Camp* 87.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Aquilæ from moon's western limb.			Double altitudes of the moon's upper limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	28	54.2	70	52	15	99	35	55
4	31	02.5	70	58	40	100	17	30
4	34	36.0	70	59	40	101	26	10
4	36	37.3	71	00	55	102	03	30
4	40	35.8	71	01	20	103	18	40
4	42	14.0	71	01	30	103	48	00
4	44	25.0	71	02	00	104	28	15
4	48	19.6	71	04	05	105	38	50
4	50	07.8	71	04	30	106	10	20
4	51	38.0	71	05	40	106	37	40
4	55	08.5	71	06	20	107	03	10
4	56	00.0	71	07	20	107	53	00
4	57	57.0	71	08	10	108	26	30

Thermometer 43°.

Time, p. m.			Distance of *a* Aldebaran from moon's western limb.			Double altitudes of the moon's upper limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	17	49.0	59	10	20	113	39	20
5	20	59.6	59	09	40	114	24	40
5	24	43.8	59	08	25	115	16	50
5	26	19.5	59	07	45	115	38	20
5	28	07.8	59	07	05	116	02	30
5	29	39.4	59	06	20	116	22	10
5	32	01.8	59	05	35	116	51	55
5	33	33.5	59	04	45	117	11	00
5	35	08.8	59	04	05	117	30	10

Thermometer 40°.

	h.	*m.*	*s.*
Longitude by west star	7	23	15.07
Longitude by east star..........................		20	18.09
Mean..........................	7	21	47.30

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APPENDIX No. 5—Continued.

October 31, 1846.—*Camp* 87.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	52	35.2	69	22	35	34	14	28
5	53	26.0	69	22	55	34	14	32
5	54	28.2	69	23	30	34	14	42
5	55	36.5	69	23	40	34	14	39
5	56	21.0	69	23	55	34	14	41
5	57	06.8	69	24	05	34	14	39
5	57	42.8	69	24	10	34	14	38
5	58	24.5	69	24	20	34	14	39
5	59	16.2	69	24	30	34	14	36
6	00	01.3	69	24	40	34	14	36
6	00	33.0	69	24	55	34	14	40

Thermometer 39°.

Mean of 11 observations, 33° 14′ 37″.

FOR INDEX ERROR.

	Min.	*sec.*
On the arc	31	55
Off the arc	31	30

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APPENDIX No. 5—Continued.

November 2, 1846.—*Camp* 89, *Disappointment creek.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	20	05.0	113	10	50	8	42	04.9
3	20	50.8	113	31	10	8	42	01.4 rej.
3	21	40.3	113	51	05	8	42	05.3
3	22	45.0	114	17	20	8	42	05.5
3	23	44.0	114	43	10	8	42	02.7
3	24	29.5	115	01	30	8	42	04.4
3	25	13.0	115	20	05	8	42	03.5
3	26	03.8	115	41	15	8	42	03.8
3	26	52.0	116	01	55	8	42	02.7

Thermometer 40°.

Time, p. m.			Double altitudes of *a* Lyræ in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	28	38.4	106	06	10	8	42	09.9 rej.
3	30	25.0	105	22	35	8	42	04.6
3	31	09.6	105	05	20	8	42	05.6
3	31	53.0	104	49	00	8	42	06.1
3	32	38.0	104	31	25	8	42	06.9
3	33	18.0	104	15	35	8	42	06.3
3	34	05.3	103	57	10	8	42	06.1
3	34	50.2	103	39	50	8	42	07.8
3	35	35.5	103	22	10	8	42	05.5

Thermometer 40°.

Mean of 16 observations, 8*h.* 42*m.* 04.96*s.*

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APPENDIX No. 5—Continued.

November 2, 1846.—*Camp* 89.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	39	40.8	68	27	40	33	14	57
3	40	47.6	68	28	05	33	14	49
3	41	48.5	68	28	45	33	14	50
3	42	29.0	68	29	10	33	14	50
3	43	31.6	68	29	45	33	14	48
3	44	13.7	68	30	20	33	14	54
3	45	06.9	68	31	10	33	15	02
3	46	03.5	68	31	20	33	14	53
3	46	57.1	68	31	55	33	14	54
3	47	43.5	68	32	20	33	14	53
3	48	55.8	68	32	55	33	14	57
3	49	13.0	68	33	20	33	14	57

Thermometer 40°.

Mean of 12 observations, 33° 14′ 54″.

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APPENDIX No. 5—Continued.

November 5, 1846.—*Camp* 91, *on the San Pedro.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
2	58	31.0	101	33	45	32	57	15
2	59	48.8	101	34	55	32	57	28
3	01	16.1	101	35	50	32	57	35
3	02	57.5	101	36	50	32	57	31
3	04	17.6	101	37	40	32	57	25
3	05	24.8	101	38	00	32	57	19
3	07	06.4	101	37	30	32	57	29
3	07	51.5	101	36	55	32	57	39
3	10	02.8	101	36	30	32	57	14
3	10	42.8	101	35	45	32	57	19
3	11	30.7	101	35	20	32	57	11
3	12	34.0	101	34	10	32	57	11
3	13	30.6	101	32	30	32	57	26

Thermometer 52°.

Mean of 13 observations, 32° 57′ 23″.

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APPENDIX No. 5—Continued.

November 5, 1846.—Camp No. 91, on the San Pedro.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	18	27.5	117	33	45	8	41	45.6
3	19	29.2	118	00	30	8	41	42.8
3	20	29.5	118	25	40	8	41	44.2
3	21	30.8	118	51	30	8	41	44.1
3	22	17.5	119	10	50	8	41	44.8
3	23	24.0	119	39	10	8	41	43.9
3	24	24.0	120	04	30	8	41	43.7
3	25	38.8	120	35	40	8	41	44.4
3	26	43.0	121	03	05	8	41	43.4

Thermometer 52°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	29	32.5	100	48	35	8	41	48.4
3	30	32.8	100	24	30	8	41	46.6
3	31	46.0	99	57	05	8	41	49.1
3	32	43.8	99	33	45	8	41	46.8
3	33	33.0	99	14	15	8	41	45.8
3	34	30.8	98	52	25	8	41	47.1
3	35	25.7	98	31	35	8	41	48.4
3	36	14.8	98	12	10	8	41	47.5
3	37	11.8	97	50	05	8	41	47.3

Thermometer 52°.

Mean of 18 observations, 8*h.* 41*m.* 45.76*s.*

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APPENDIX No. 5—Continued.

November 5, 1846.—Camp 91, on the San Pedro, about ——— from its mouth at the Gila.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	40	39.0	68	01	30	32	57	54
3	41	55.5	68	02	30	32	58	02
3	43	23.6	68	03	00	32	57	55
3	44	11.5	68	04	00	32	58	07
3	45	23.8	68	04	20	32	58	07
3	46	39.8	68	05	15	32	58	04
3	47	26.0	68	05	55	32	58	04
3	48	12.8	68	06	20	32	58	09
3	49	22.8	68	06	45	32	57	59
3	50	37.6	68	07	30	32	58	03
3	51	16.0	68	07	30	32	58	03
3	51	54.7	68	08	10	32	58	03

Thermometer 52°.

Mean of 12 observations, 32° 58′ 03″.

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APPENDIX No. 5—Continued.

November 5, 1846.—*Camp* 91, *on the San Pedro.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of α Arietis from moon's eastern limb.			Double altitudes of moon's upper limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
12	29	20.0	48	22	30	134	00	30
12	31	01.5	48	22	40	133	26	20
12	32	40.8	48	22	55	132	50	10
12	34	14.2	48	23	40	132	17	35
12	36	29.0	48	23	40	131	30	30
12	38	25.5	48	23	55	130	48	30
12	40	22.6	48	25	40	130	05	30
12	42	09.5	48	26	30	129	27	00
12	43	37.8	48	26	50	128	54	10
12	44	51.5	48	27	10	128	28	10
12	47	31.2	48	27	40	127	29	30
12	49	26.8	48	28	15	126	45	50

Thermometer 32°.

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APPENDIX No. 5—Continued.

November 5, 1846.—*Camp* 91, *on the San Pedro.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Regulus from moon's eastern limb.			Double altitudes of moon's upper limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
12	57	55.2	65	18	45	123	36	00
12	59	49.5	65	18	00	122	52	15
13	01	38.0	65	17	20	122	11	15
13	05	13.8	65	16	35	121	34	40
13	04	47.5	65	16	00	120	59	30
13	06	04.5	65	15	30	120	29	50
13	07	57.8	65	14	55	119	46	40
13	09	15.0	65	14	30	119	16	20
13	10	51.5	65	13	55	118	49	00

Thermometer 32°.

Longitude, by mean of observations, 7*h.* 23*m.* 46.9*s.*

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APPENDIX No. 5—Continued.

November 6, 1846.—Camp 91, on the San Pedro.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	12	38.0	116	51	40	8	41	32.2
3	13	45.8	117	20	15	8	41	32.0
3	14	31.0	117	40	00	8	41	30.5
3	15	26.0	118	02	45	8	41	31.1
3	16	19.7	118	24	50	8	41	32.3
3	17	17.6	118	50	05	8	41	30.1
3	18	12.8	119	12	25	8	41	32.2
3	18	59.8	119	33	15	8	41	29.6

Thermometer 64°.

Time, p. m.			Double altitudes of *a* Lyræ. in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min*	*sec.*	*h.*	*m.*	*s.*
3	22	56.5	101	45	35	8	41	35.1
3	23	53.8	101	21	55	8	41	31.5 rej.
3	24	44.8	101	03	15	8	41	34.4
3	25	22.5	100	49	05	8	41	35.6
3	26	11.2	100	29	50	8	41	34.6
3	27	07.5	100	08	15	8	41	35.3
3	28	00.5	99	47	45	8	41	35.6
3	28	55.8	99	25	50	8	41	34.3

Thermometer 64°.

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APPENDIX No. 5—Continued.

November 6, 1846.—Camp 91, on the San Pedro.

DETERMINATION OF LONGITUDE.

Time.			Distance of Aldebaran from moon's western limb.			Double altitudes of moon's upper limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
7	43	11.0	25	53	55	65	27	10
7	44	45.2	25	54	25	66	06	20
7	47	03.8	25	55	35	67	03	10
7	49	18.0	25	56	15	67	58	10
7	51	03.0	25	57	15	68	40	50

Thermometer 42°.

Immersion of Jupiter's satellite, 6*h.* 42*m.* 40*s.*

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APPENDIX No. 5—Continued.

November 8, 1846.—*Camp* 93, *on the Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *b* Aquarii, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
2	49	26.8	101	19	40	33	05	18
2	50	27.5	101	20	15	33	05	25
2	51	29.0	101	20	50	33	05	28
2	52	28.7	101	21	20	33	05	27
2	53	22.9	101	21	35	33	05	27
2	54	37.6	101	21	40	33	05	30
2	56	03.5	101	22	00	33	05	16
2	56	56.0	101	21	40	33	05	18
2	57	44.2	101	21	00	33	05	27
2	59	11.0	101	20	30	33	05	14
3	00	19.9	101	19	20	33	05	20

Thermometer 44°.

Mean of 12 observations, 33° 05′ 24″.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	30	26.0	68	17	40	33	05	48
3	31	20.0	68	18	10	33	05	48
3	32	32.5	68	18	40	33	05	43
3	33	38.5	68	19	45	33	05	58
3	34	29.0	68	20	10	33	05	55
3	35	07.2	68	20	45	33	06	02
3	35	47.0	68	21	20	33	06	09
3	36	28.8	68	21	45	33	06	09
3	37	18.0	68	22	15	33	06	01

Thermometer 42°.

Mean of 9 observations, 33° 05′ 57″.

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APPENDIX No. 5—Continued.

November 8, 1846.—Camp 93, on the Gila.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	05	32.0	116	43	10	8	42	39.2
3	06	26.8	117	05	45	8	42	40.3
3	07	27.6	117	32	40	8	42	37.0
3	08	33.5	117	59	15	8	42	39.5
3	09	30.0	118	23	40	8	42	37.9
3	10	22.3	118	45	20	8	42	39.5
3	11	13.8	119	06	55	8	42	38.6
3	12	24.6	119	36	50	8	42	38.2

Thermometer 42°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	15	31.0	102	07	10	8	42	41.6
3	16	29.5	101	44	40	8	42	42.2
3	17	19.0	101	25	55	8	42	43.5
3	18	21.5	101	01	35	8	42	43.2
3	19	10.8	100	42	55	8	42	44.4
3	20	02.8	100	21	40	8	42	41.6
3	20	46.8	100	04	45	8	42	42.0
3	21	42.2	99	43	15	8	42	41.9

Thermometer 42°.

Mean of 16 observations, 8*h.* 42*m.* 40.66*s.*

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APPENDIX No. 5—Continued.

November 10, 1846.—*Camp* 95, *Caroon plain, on the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of α Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	51	20.2	113	20	05	8	44	24.1
2	52	11.5	113	41	35	8	44	23.3
2	53	21.0	114	10	30	8	44	24.0
2	54	10.8	114	30	50	8	44	25.3
2	55	03.8	114	53	05	8	44	23.3
2	56	05.0	115	19	25	8	44	23.9
2	56	59.6	115	42	15	8	44	24.0
2	57	52.1	116	04	35	8	44	25.3

Thermometer 52°.

Time, p. m.			Double altitudes of α Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	03	15.5	104	30	25	8	44	29.5
3	04	18.0	104	05	30	8	44	27.7
3	05	07.8	103	46	10	8	44	27.9
3	06	01.1	103	25	40	8	44	28.5
3	06	47.8	103	07	35	8	44	28.6
3	07	30.8	102	51	20	8	44	29.8
3	08	13.5	102	34	10	8	44	28.4
3	09	00.5	102	15	45	8	44	29.1
3	09	47.8	101	57	50	8	44	29.3

Thermometer 52°.

Mean of 18 observations, 8*h*. 44*m*. 26.52*s*.

APPENDIX No. 5—Continued.

November 10, 1846.—*Camp* 95.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	27	02.0	68	16	25	33	04	25
3	27	55.8	68	16	45	33	04	20
3	28	50.0	68	17	20	33	04	22
3	29	41.8	68	17	55	33	04	26
3	30	30.0	68	18	15	33	04	22
3	31	14.5	68	18	30	33	04	17
3	31	52.5	68	18	55	33	04	20
3	32	23.8	68	19	10	33	04	17
3	33	08.5	68	19	40	33	04	21
3	34	00.5	68	19	55	33	04	14
3	34	44.0	68	21	00	33	04	31 rej.
3	35	44.5	68	21	00	33	04	18
3	36	25.8	68	21	30	33	04	27

Thermometer 50°.

Mean of 12 observations, 33° 04′ 21″.

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APPENDIX No. 5—Continued.

November 12, 1846.—*Camp 97, below Pimos village, about four miles from the Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of δ Aquarii, near the meridian.			Latitude.			
h.	*m.*	*s.*	*Deg*	*min.*	*sec.*	*Deg.*	*min*	*sec.*	
2	35	15.0	101	09	45	33	09	32	
2	37	17.0	101	12	20	33	09	10	
2	38	28.5	101	12	45	33	09	22	
2	39	53.8	101	13	05	33	09	29	
2	40	55.8	101	13	40	33	09	20	
2	41	50.3	101	14	05	33	09	09	
2	43	05.5	101	13	25	33	09	25	
2	43	40.0	101	12	50	33	09	37	rej.
2	44	29.8	101	13	10	33	09	18	
2	45	18.0	101	12	45	33	09	17	
2	46	12.0	101	12	00	33	09	22	
2	47	07.5	101	11	20	33	09	19	
2	48	25.0	101	10	25	33	09	07	
2	49	41.5	101	08	25	33	09	19	

Thermometer 50°.

Mean of 13 observations, 33° 09′ 19″

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APPENDIX No. 5—Continued.

November 13, 1846.—*Camp* 97.

DETERMINATION OF LONGITUDE.

Time, a. m.			Distance between sun's and moon's nearest limbs.			Double altitude of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	16	46.8	60	36	45			
4	18	10.0	60	56	25			
4	20	59.5	60	56	05			
4	23	05.2	60	55	30	114	18	15
4	24	45.8	60	55	00	114	20	50
4	26	17.0	60	54	20	114	22	25
4	28	09.2	60	34	25	114	23	30
4	31	26.5	60	33	05	114	25	00
4	33	00.0	60	32	50	114	24	50
4	34	47.3	60	52	45	114	23	40
4	36	04.8	60	32	05	114	22	10
4	38	25.0	60	31	25	114	19	30
4	40	07.6	60	31	05	114	16	10
4	41	26.5	60	30	30	114	13	50

Thermometer 54°.

INDEX ERROR.

On the arc.................................... 31.55″
Off the arc.................................... 32.25

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APPENDIX No. 5—Continued.

November 12, 1846.—*Camp* 97.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	55	19.8	117	53	15	8	45	23.8
2	56	27.2	118	21	15	8	45	25.2
2	57	31.0	118	48	20	8	45	24.5
2	58	17.0	119	07	10	8	45	25.7
2	59	04.7	119	27	40	8	45	22.5
2	59	48.5	119	46	15	8	45	23.9
3	00	32.8	120	04	55	8	45	23.8
3	01	29.2	120	29	15	8	45	22.1
3	02	16.8	120	48	25	8	45	24.1
3	03	05.0	121	08	38	8	45	24.2

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	07	26.8	100	15	40	8	45	26.9
3	08	11.2	99	59	05	8	45	28.5
3	09	19.8	99	31	50	8	45	27.9
3	10	05.5	99	14	15	8	45	27.2
3	11	03.8	98	51	45	8	45	27.3
3	11	45.5	98	35	45	8	45	27.9
3	12	50.0	98	10	55	8	45	28.2
3	13	47.2	97	48	40	8	45	27.9
3	14	35.5	97	29	50	8	45	27.5
3	15	24.8	97	10	30	8	45	26.8
3	16	19.8	96	49	10	8	45	26.7
3	17	05.0	96	31	25	8	45	26.0

Thermometer 50°.

Mean of 22 observations, 8*h*. 45*m*. 25.79*s*.

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APPENDIX No. 5—Continued.

November 12, 1846.—*Camp* 97.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	28	58.5	68	31	50	33	09	40
3	29	52.5	68	32	20	33	09	41
3	30	46.0	68	32	50	33	09	41
3	31	51.8	68	33	05	33	09	31
3	33	16.0	68	34	00	33	09	35
3	34	05.0	68	34	35	33	09	40
3	35	03.8	68	34	55	33	09	33
3	36	07.0	68	35	40	33	09	38
3	37	04.0	68	36	05	33	09	35
3	37	41.8	68	36	45	33	09	43
3	38	34.2	68	37	00	33	09	58
3	39	11.5	68	37	35	33	09	31

Thermometer 48°.

Mean of 12 observations, 33° 09′ 37″.

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APPENDIX No. 5—Continued.

November 13, 1846.—*Camp* 97.

DETERMINATION OF TIME.

Time, a. m.			Double altitudes of sun's upper limb.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
5	41	04.8	50	23	10	8	45	18.9
5	42	28.7	50	47	35	8	45	19.7
5	42	59.0	50	57	15	8	45	17.2
5	43	40.0	51	08	50	8	45	18.5
5	44	34.0	51	24	55	8	45	17.3
5	45	38.5	51	43	20	8	45	18.6
5	46	35.8	52	00	10	8	45	17.7
5	47	05.8	52	09	00	8	45	17.2
5	47	42.5	52	18	28	8	45	21.0 rej.
5	48	38.0	52	35	15	8	45	17.8
5	49	22.5	52	48	05	8	45	17.7
5	50	14.5	53	02	35	8	45	18.8

Thermometer 60°.

Mean of 11 observations, 8*h.* 45*m.* 18.13*s.*

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APPENDIX No. 5—Continued.

November 14, 1846.—*Camp* 99, *on the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	42	53.0	114	56	50	8	47	49.3
2	43	54 6	115	22	45	8	47	49.2
2	44	54.2	115	47	50	8	47	51.2
2	45	57.5	116	13	45	8	47	50.7
2	46	48.0	116	35	35	8	47	49.2
2	47	47.0	117	00	10	8	47	47.6
2	48	32.0	117	19	00	8	47	50.1
2	49	21.5	117	40	05	8	47	49.5

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	17	07.0	94	16	50	8	47	54.0
3	17	55.8	93	58	10	8	47	52.9
3	18	44.0	93	39	40	8	47	53.2
3	19	38.8	93	19	10	8	47	54.8
3	20	37.0	92	55	20	8	47	51.3
3	22	02.8	92	21	15	8	47	48.5 rej.
3	22	52.8	92	03	10	8	47	51.7
3	23	37.0	91	46	20	8	47	52.2

Thermometer 50°.

Mean of 15 observations, 8*h.* 47*m.* 51.23*s.*

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APPENDIX No. 5—Continued.

November 14, 1846.—*Camp* 99, *on the Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitude of Saturn, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
2	52	36.2	84	14	10	32	59	17
2	53	33.0	84	15	40	32	59	07
2	54	23.5	84	16	30	32	59	10
2	55	06.8	84	17	05	32	59	13
2	56	52.5	84	18	30	32	59	14
2	58	08.2	84	19	55	32	58	53
2	59	15.5	84	20	05	32	59	03
3	00	25.8	84	20	50	32	58	50
3	01	51.5	84	20	30	32	59	03
3	02	48.0	84	20	10	32	59	10
3	03	50.0	84	19	55	32	59	10
3	04	54.8	84	19	15	32	59	17
3	06	04.8	84	18	35	32	59	21
3	07	19.2	84	17	45	32	59	16
3	08	26.8	84	17	10	32	59	04
3	09	22.8	84	15	40	32	59	20
3	10	10.8	84	14	40	32	59	22

Thermometer 50°.

Mean of 17 observations, 32° 59′ 10″.

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APPENDIX No. 5—Continued.

November 14, 1846.—*Camp* 99, *on the Gila.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	28	14.8	68	14	20	32	59	36
3	29	28.5	68	14	35	32	59	25
3	30	27.0	68	15	15	32	59	29
3	32	19.0	68	16	00	32	59	20
3	33	36.8	68	17	05	32	59	34
3	35	02.5	68	18	05	32	59	40
3	36	06.8	68	18	25	32	59	34
3	37	08.5	68	19	05	32	59	39
3	38	04.6	68	19	45	32	59	35

Thermometer 50°.

Mean of 9 observations, 32° 59′ 34″.

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APPENDIX No. 5—Continued.

November 15, 1846.—*Camp* 99.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	41	43.6	116	12	05	8	47	36.7
2	42	41.7	116	35	50	8	47	38.3
2	43	22.5	116	53	20	8	47	37.5
2	43	59.8	117	08	20	8	47	38.8
2	44	35.0	117	23	45	8	47	37.6
2	45	28.0	117	46	20	8	47	36.9
2	46	14.8	118	05	40	8	47	37.6
2	46	56.0	118	23	10	8	47	37.2

Thermometer °.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
2	48	47.8	103	38	55	8	47	40.1	
2	49	42.0	103	18	35	8	47	41.2	
2	50	23.0	103	02	05	8	47	40 6	
2	51	06.8	102	44	10	8	47	57.5	rej.
2	51	50.0	102	28	40	8	47	40.8	
2	52	38.5	102	08	50	8	47	38.2	
2	53	19.0	101	53	55	8	47	40.4	
2	54	15.2	101	32	05	8	47	40.4	

Mean of 15 observations, 8*h.* 47*m.* 38.91*s.*

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APPENDIX No. 5—Continued.

November 14, 1846.—*Camp* 101, *on the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Algenib, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	14	02.8	116	17	50	8	49	33.0
3	15	00.0	116	38	55	8	49	32.9
3	16	12.5	117	05	45	8	49	32.3
3	17	12.5	117	26	55	8	49	31.2
3	18	08.0	117	47	30	8	49	33.2
3	19	02.5	118	07	35	8	49	32.4
3	19	55.3	118	26	45	8	49	32.4
3	20	42.2	118	43	25	8	49	33.1
3	21	52.8	119	09	15	8	49	31.9

Thermometer 40°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*	
3	24	29.8	87	31	20	8	49	37.1	
3	25	16.8	87	13	20	8	49	37.2	
3	26	03.5	86	55	10	8	49	36.6	
3	26	57.8	86	34	10	8	49	36.0	
3	28	02.0	86	08	45	8	49	33.9	rej.
3	28	52.6	85	49	55	8	49	35.4	
3	29	54.3	85	26	20	8	49	38.3	
3	30	35.5	85	10	50	8	49	36.1	
3	31	14.0	84	56	20	8	49	37.1	

Thermometer 40°.

Mean of 17 observations, 8*h*. 49*m*. 34.76*s*.

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APPENDIX No. 5—Continued.

November 17, 1846.—*Camp* 101.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	51	28.5	68	22	55	32	55	40
3	52	32.8	68	23	20	32	55	38
3	53	52.3	68	24	05	32	55	43
3	54	46.0	68	25	10	32	56	05
3	56	07.0	68	25	00	32	55	41
3	57	42.8	68	25	50	32	55	46
3	58	50.5	68	26	25	32	55	48
3	59	35.0	68	27	00	32	55	58
4	00	13.5	68	27	25	32	56	00
4	00	52.8	68	27	45	32	56	02
4	01	28.0	68	28	05	32	56	04
4	02	20.0	68	28	20	32	56	00

Thermometer 38°.

Mean of 12 observations, 32° 55′ 52″.

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APPENDIX No. 5—Continued.

November 19, 1846.—*Camp* 103, *on an island of the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	40	47.5	78	47	20	8	51	21.6
3	41	34.8	78	29	00	8	51	20.7
3	42	21.0	78	10	45	8	51	18.7
3	43	12.0	77	51	05	8	51	17.9
3	44	16.5	77	26	55	8	51	18.8
3	45	04.3	77	09	10	8	51	19.7
3	45	48.2	76	52	35	8	51	19.9
3	46	34.8	76	34	55	8	51	19.9
3	47	26.5	76	15	10	8	51	19.4

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	53	19.0	97	50	55	8	51	17.1
3	54	11.2	98	13	10	8	51	16.5
3	54	57.8	98	32	00	8	51	18.4
3	55	39.8	98	50	05	8	51	17.4
3	56	32.0	99	12	20	8	51	16.8
3	57	21.0	99	33	10	8	51	16.3
3	58	40.0	100	05	45	8	51	18.0
3	59	30.8	100	27	45	8	51	16.4
4	00	11.0	100	44	45	8	51	16.4
4	00	51.2	101	01	35	8	51	16.5

Thermometer 50°.

Mean of 19 observations, 8*h.* 51*m.* 18.30*s.*

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APPENDIX No. 5—Continued.

November 19, 1846.—*Camp* 103.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	08	37.0	68	09	05	32	43	55
4	09	32.5	68	10	00	32	44	13
4	10	37.8	68	10	00	32	44	01
4	11	06.5	68	10	25	32	44	08
4	12	42.0	68	10	50	32	44	02
4	13	27.2	68	11	00	32	43	59
4	14	10.8	68	11	25	32	44	03
4	14	32.0	68	11	50	32	44	09
4	15	57.0	68	12	20	32	44	12
4	16	46.0	68	12	30	32	44	18
4	17	56.5	68	12	55	32	44	09
4	19	33.0	68	13	10	32	44	00
4	20	40.5	68	13	25	32	43	55

Thermometer 46°.

Mean of 13 observations, 32° 44′ 05″.

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APPENDIX No. 5—Continued.

November 19, 1846.—*Camp* 103.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Procyon, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min*	*sec.*	*Deg.*	*min*	*sec.*
12	16	18.0	125	34	55	32	43	40
12	17	58.8	125	39	55	32	43	00
12	20	46.8	125	43	15	32	43	37
12	23	26.2	125	46	15	32	43	27
12	25	00.5	125	48	00	32	42	58
12	27	09.0	125	48	10	32	42	55
12	29	42.0	125	46	30	32	43	04
12	31	34.0	125	42	35	32	44	02
12	33	49.8	125	41	50	32	42	39
12	34	47.7	125	39	05	32	43	06
12	36	54.5	125	35	40	32	42	21

Thermometer 28°.

Mean of 11 observations, 32° 43′ 11″.

APPENDIX No. 5—Continued.

November 21, 1846.—*Camp* 105, *on the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	21	02.0	83	44	15	8	52	28.0
3	21	49.2	83	25	35	8	52	26.4
3	22	43.9	83	05	10	8	52	27.6
3	23	27.8	82	48	25	8	52	27.6
3	24	17.2	82	29	55	8	52	28.6
3	25	12.0	82	08	35	8	52	27.7
3	25	55.5	81	52	15	8	52	28.2
3	27	16.0	81	20	20	8	52	25.0 rej.
3	27	55.9	81	06	05	8	52	27.6

Thermometer 40°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	32	43.3	92	00	30	8	52	25.9 rej.
3	33	36.0	92	24	00	8	52	21.9
3	34	32.0	92	47	10	8	52	22.8
3	35	40.8	93	16	10	8	52	23.0
3	36	27.6	93	35	45	8	52	23.3
3	37	16.8	93	57	15	8	52	21.4
3	38	19.5	94	23	45	8	52	21.3
3	39	15.5	94	47	30	8	52	20.9
3	40	15.0	95	12	40	8	52	21.8

Thermometer 40°.

Mean of 16 observations, 8*h*. 52*m*. 24.88*s*.

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APPENDIX No. 5—Continued.

November 21, 1846.—*Camp* 105.

DETERMINATION OF LATITUDE.

Time. p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	45	29.0	68	00	30	32	42	58 rej.
3	46	33.8	68	01	40	32	43	17
3	47	23.8	68	01	50	32	43	13
3	48	20.7	68	02	10	32	43	10
3	49	03.1	68	02	30	32	43	12
3	49	47.8	68	03	05	32	43	19
3	50	24.2	68	03	25	32	43	22
3	50	58.0	68	03	50	32	43	27
3	51	49.5	68	04	00	32	43	22
3	52	25.0	68	04	10	32	43	20
3	53	04.9	68	04	20	32	43	16
3	53	46.8	68	04	30	32	43	13
3	54	23.5	68	04	45	32	43	13

Thermometer 40°.

Mean of 12 observations, 32° 43′ 17″.

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APPENDIX No. 5—Continued.

November 22, 1846.—*Camp* 106, *near the mouth of the Gila*, 5, *p. m.*

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Fomalhaut from moon's western limb.			Double altitudes of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min*	*sec.*	*Deg.*	*min.*	*sec.*
2	41	39.0	46	52	15	58	40	50
2	44	10.8	46	51	40	58	01	20
2	46	53.8	46	50	20	57	18	30
2	49	15.0	46	49	45	56	41	10
2	52	36.2	46	48	45	55	46	20
2	56	17.5	46	47	30	54	46	10
3	02	06.0	46	45	35	53	08	55
3	03	49.2	46	45	10	52	49	50
3	06	13.8	46	44	40	51	58	50

Thermometer 60°.

Longitude, by mean of observations, 7*h.* 40*m.* 50.00*s.*

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APPENDIX No. 5—Continued.

November 22, 1846.—*Camp* 106, *near the mouth of the Gila.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	14	13.3	85	09	35	8	53	20.9
3	15	16.7	84	41	55	8	53	20.9
3	16	17.6	84	21	35	8	53	19.8
3	17	13.8	83	59	30	8	53	18.3
3	18	05.9	83	40	10	8	53	19.8
3	18	54.0	83	21	40	8	53	19.5
3	19	53.0	82	59	00	8	53	19.2
3	20	44.8	82	40	05	8	53	21.5
3	21	35.2	82	20	15	8	53	20.0

Thermometer 60°.

Time, p. m.			Double altitudes of *a* Arietis. in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	28	17.5	91	26	10	8	53	16.7
3	29	06.0	91	47	40	8	53	14.2
3	29	58.8	92	09	40	8	53	16.0
3	30	49.8	92	30	20	8	53	16.8
3	31	33.5	92	49	30	8	53	15.0
3	32	28.0	93	11	25	8	53	18.6
3	33	33.8	93	40	10	8	53	15.2
3	34	55.0	94	14	15	8	53	15.5
3	35	54.8	94	39	15	8	53	18.0

Thermometer 60°.

Mean of 18 observations, 8*h*. 53*m*. 18.10*s*

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APPENDIX No. 5—Continued.

November 22, 1846.—*Camp* 106.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	48	19.5	68	01	50	32	42	21
3	49	26.0	68	02	15	32	42	19
3	59	18.0	68	02	30	32	42	18
3	59	59.8	68	02	25	32	42	08
3	52	56.0	68	03	30	32	42	15
3	54	08.0	68	04	10	32	42	15
3	55	12.8	68	04	20	32	42	14
3	56	07.8	68	05	05	32	42	25
3	57	10.9	68	05	20	32	42	22
3	58	23.2	68	05	35	32	42	14
3	59	26.8	68	05	45	32	42	08
4	00	35.2	68	06	05	32	42	05
4	01	51.8	68	06	45	32	42	11

Thermometer 60°.

Mean of 13 observations, 32° 42′ 15″.

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APPENDIX No. 5—Continued.

November 23, 1846.—*Camp* 106.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Saturn in the west.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
2	39	36.5	85	06	00
2	40	38.5	85	04	50
2	41	37 0	85	03	20
2	42	42.8	85	02	50
2	43	20.0	85	01	10
2	44	01.0	85	00	00

Thermometer 56°.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of *a* Arietis from moon's western limb.			Double altitudes of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	15	51.0	88	30	55	68	50	20
3	20	08.8	88	28	10	67	47	20
3	22	08.5	88	27	20	67	17	45
3	28	06.0	88	24	45	65	46	50
3	30	41.5	88	23	50	65	06	55
3	34	08.5	88	22	30	64	11	50
3	35	54.8	88	21	40	63	44	00

Thermometer 56°.

	h.	*m.*	*s.*
Longitude by *a* Arietis	7	39	46.5
Longitude by Fomalhaut..........................	7	40	50.0
Mean..............................	7	40	18.25

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APPENDIX No. 5—Continued.

November 25, 1846.—*Camp* 106.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.			
h.	*m.*	*s.*	*Deg.*	*min*	*sec.*	*h.*	*m.*	*s.*	
3	42	58.8	99	22	55	8	53	02.9	
3	43	56.0	99	46	25	8	53	04.5	
3	44	37.8	100	02	45	8	53	07.4	rej.
3	45	31.8	100	26	20	8	53	05.3	
3	46	22.0	100	48	10	8	53	03.7	
3	47	10.8	101	08	35	8	53	03.9	
3	47	59.0	101	28	65	8	53	03.5	
4	48	55.5	101	52	25	8	53	04.6	
4	49	39.0	102	11	20	9	53	03.1	

Thermometer 54°.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	54	46.8	68	12	40	8	53	05.1
3	55	48.0	67	49	40	8	53	04.9
3	56	36.5	67	32	15	8	53	06.8
3	57	18.3	67	16	40	8	53	06.8
3	58	08.8	66	57	50	8	53	06.8
3	58	53.8	66	40	25	8	53	05.1
3	59	32.8	66	26	20	8	53	06.3
4	00	20.8	66	08	10	8	53	03.5
4	01	04.0	65	52	30	8	53	06.7

Thermometer 52°.

Mean of 17 observations, 8*h.* 53*m.* 04.86*s.*

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APPENDIX No. 5—Continued.

November 23, 1846.—*Camp* 106.

Time, p. m.			Double altitudes of Sirius, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
11	14	39.8	81	34	55	32	42	06
11	15	36.0	81	35	20	32	42	11
11	16	30.7	81	36	10	32	41	59
11	17	33.6	81	36	20	32	42	05
11	18	36.8	81	36	40	32	42	01
11	19	33 0	81	36	30	32	42	23 rej.
11	21	17.5	81	36	20	32	42	06
11	22	17.0	81	36	20	32	41	57
11	23	06.0	81	35	45	32	42	04
11	23	54.8	81	35	10	32	42	07
11	24	40.0	81	34	45	32	42	05
11	25	41.6	81	34	05	32	42	01
11	27	00.0	81	33	10	32	41	51

Thermometer 46°.

Mean of 12 observations, 32° 42′ 03″.

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APPENDIX No. 5—Continued.

November 25, 1846.—*Camp* 108—*first camp after leaving the Rio Colorado.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	05	57.5	84	02	20	8	53	63.1 rej.
3	06	40.8	83	44	15	8	53	59.2
3	07	27.9	83	26	35	8	54	01.1
3	08	16.5	83	07	45	8	53	59.5
3	09	10.9	82	46	50	8	53	59.2
3	09	59.8	82	28	35	8	53	60.4
3	10	48.0	82	09	30	8	53	58.7
3	11	34.8	81	51	35	8	53	58.6

Thermometer 46°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	16	18.5	91	06	00	8	53	54.4
3	17	14.0	91	31	25	8	53	49.8 rej.
3	17	52.5	91	45	15	8	53	55.6
3	18	31.6	92	02	00	8	53	54.9
3	19	15.0	92	20	55	8	53	53.4
3	19	58.5	92	39	35	8	53	52.8
3	20	39.5	92	56	30	8	53	53.8
3	21	26.8	93	16	20	8	53	54.0

Thermometer 46°.

Mean of 14 observations, 8*h.* 53*m.* 56.82*s.*

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APPENDIX No. 5—Continued.

November 25, 1846.—*Camp* 108.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	24	40.5	67	52	05	32	40	11
3	25	46.2	67	52	55	32	40	22
3	26	45.0	67	53	10	32	40	16
3	27	31.8	67	53	30	32	40	16
3	28	51.5	67	54	20	32	40	24
3	29	44.0	67	54	40	32	40	22
3	30	26.8	67	55	05	32	40	25
3	31	06.5	67	55	45	32	40	33
3	32	01.0	67	55	45	32	40	24
3	38	25.0	67	56	30	32	40	30

Thermometer 44°.

Mean of 10 observations, 32° 40′ 22″.

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APPENDIX No. 5—Continued.

November 28, 1846.—*Camp* 111.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Aldebaran from moon's western limb.			Double altitude of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	27	34.0	49	25	25	129	01	40
5	29	22.8	49	24	45	129	05	50
5	31	16.0	49	23	55	129	08	25
5	33	17.5	49	23	05	129	11	10
5	05	15.8	49	22	35	129	12	20
5	37	22.8	49	21	50	129	13	00
5	39	25.8	49	21	15	129	12	40
5	41	25.8	49	20	25	129	11	10

Thermometer 44°.

Longitude, by mean of observations, 7*h.* 43*m.* 06.4*s.*

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APPENDIX No. 5—Continued.

November, 28, 1846.—*Camp* 111.

DETERMINATION OF LONGITUDE.

Time, p. m.			Distance of Fomalhaut from moon's western limb.			Double altitudes of moon's lower limb.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min*	*sec.*
5	48	51.0	50	32	50	128	57	30
5	51	03.8	50	33	20	128	50	20
5	53	43.7	50	34	10	128	40	30
5	58	03.5	50	35	35	128	22	15
6	01	58.0	50	36	10	128	00	00
6	05	24.1	50	37	50	127	38	30
6	08	12.5	50	39	00	127	19	20
6	10	19.2	50	39	00	127	03	20
6	15	10.0	50	40	30	126	40	10
6	16	02.7	50	41	20	126	15	30
6	19	19.0	50	42	40	125	45	50

Thermometer 44°.

	h.	*m.*	*s.*
Longitude by Fomalhaut...........................	7	43	43.01
Longitude by Aldebaran		54	06.04
Mean...........................	7	43	24.75

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APPENDIX No. 5—Continued.

November 28.—*Camp* 111, *Cariso creek, first after passing the Jornada.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	49	25.5	87	31	40	8	57	58.4
2	50	20.0	87	10	40	8	57	57.2
2	51	10.0	86	51	20	8	57	56.8
2	51	54.5	86	34	45	8	57	37.9
2	52	43.0	86	15	30	8	57	56.4
2	53	23 3	86	00	20	8	57	57.0
2	54	18.2	85	39	35	8	57	57.7
2	55	07.3	85	19	50	8	57	55.2
2	55	51.5	85	03	35	8	57	55.0

Thermometer 48°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	02	01.8	88	21	15	8	57	56.7
3	03	06.2	88	47	45	8	57	58.2
3	03	59.8	89	10	05	8	57	58.8
3	04	55.5	89	33	45	8	57	58.2
3	05	55.8	89	59	45	8	57	56.7
3	06	47.8	90	21	10	8	57	57.8
3	07	47.5	90	46	30	8	57	57.3
3	08	32.8	91	05	25	8	57	57.7
3	09	21.5	91	27	35	8	57	53.7 rej.

Thermometer 48°.

Mean of 17 observations, 8*h*. 57*m*. 57.26*s*.

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APPENDIX No. 5—Continued.

November 28, 1846.—*Camp* 111.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*	
3	23	15.0	68	19	25	32	52	31	
3	24	09.0	68	19	40	32	52	28	
3	25	04.5	68	20	00	32	52	25	
3	26	06.5	68	19	30	32	51	56	rej.
3	26	50.0	68	21	20	32	52	43	
3	27	35.0	68	21	35	32	52	40	
3	28	22.5	68	21	40	32	52	33	
3	29	34.5	68	21	50	32	52	24	
3	30	52.0	68	22	20	32	52	24	
3	32	11.8	68	23	20	32	52	37	
3	33	20.0	68	23	40	32	52	34	
3	34	02.5	68	23	55	32	52	33	
3	35	20.0	68	24	25	32	52	39	

Thermometer 46°.

Mean of 12 observations, 32° 52′ 33″.

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APPENDIX No. 5—Continued.

November 29, 1846.—*Camp* 112, "*Valle Citon.*"

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	47	23.8	87	10	05	8	58	44.1
2	48	17.0	86	49	10	8	58	42.7
2	49	13.9	86	27	20	8	58	42.6
2	50	03.5	86	08	25	8	58	42.9
2	50	51.5	85	50	15	8	58	43.5
2	51	32.0	85	35	05	8	58	44.2
2	52	24.2	85	14	45	8	58	43.3
2	53	12.4	84	56	10	8	58	42.9

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	58	01.0	87	59	50	8	58	43.7
2	58	50.3	88	21	20	8	58	41.9
2	59	30.0	88	37	35	8	58	42.9
3	00	19.2	88	58	30	8	58	42.4
3	01	20.3	89	23	55	8	58	42.9
3	02	16.5	89	48	35	8	58	40.5
3	03	10.8	90	10	35	8	58	42.4
3	04	12.0	90	36	40	8	58	41.8
3	05	04.2	90	58	35	8	58	41.7

Thermometer 50°.

Mean of 17 observations, 8*h*. 58*m*. 42.78*s*.

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APPENDIX No. 5—Continued.

November 30, 1846.—*Camp* 112

DETERMINATION OF TIME.

Time, p. m.	Double altitudes of *a* Lyræ, in the west.	Chronometer fast.
h. m. s.	*Deg. min. sec.*	*h. m. s.*
2 47 58.8	85 21 15	8 58 31.2
2 48 46.6	85 02 55	8 58 31.2
2 49 38.8	84 42 55	8 58 30.7
2 50 27.5	84 24 15	8 58 30.5
2 51 11.0	84 07 45	8 58 30.7
2 51 55.2	83 50 40	8 58 30.3
2 52 45.0	83 31 20	8 58 29.3
2 53 29.9	83 14 25	8 58 29.9
2 54 21.7	82 55 05	8 58 31.1

Thermometer 48°.

Time, p. m.	Double altitudes of *a* Arietis, in the east.	Chronometer fast.
h. m. s.	*Deg. min. sec.*	*h. m. s.*
3 14 21.0	96 37 20	8 58 28.1
3 16 50.8	97 40 10	8 58 27.6
3 17 25.0	97 54 10	8 58 29.1
3 19 40.6	98 50 50	8 58 29.9
3 22 24.8	99 59 55	8 58 29.5

Thermometer 48°.

Mean of 14 observations, 8*h.* 58*m.* 29.69*s.*

Boisterous and cloudy. The ground at this camp is spongy, and shaken by the lightest tread.

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APPENDIX No. 5—Continued.

November 29, 1846.—*Camp* 112.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	08	45.0	68	26	20	32	58	24
3	09	51.8	68	26	40	32	58	24
3	10	47.5	68	27	30	32	58	32
3	12	02.0	68	27	45	32	58	20
3	13	02.5	68	27	55	32	58	13
3	13	52.5	68	28	15	32	58	10
3	14	33.5	68	28	35	32	58	12
3	15	26.0	68	28	55	32	58	10
3	16	04.0	68	29	10	32	58	09
3	16	40.8	68	29	20	32	58	02
3	17	27.0	68	29	55	32	58	14
3	18	06.2	68	30	00	32	58	8

Thermometer 50°.

Mean of 12 observations, 32° 58′ 15″

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APPENDIX No. 5—Continued.

December 2, 1846.—*Camp* 114, "*Warner's.*"

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	45	26.8	83	51	55	8	59	16.0
2	46	22.5	83	31	10	8	59	17.2
2	47	17.9	83	10	05	8	59	17.3
2	47	56.8	82	54	55	8	59	16.4
2	48	41.0	82	37	35	8	59	18.1
2	49	31.7	82	18	30	8	59	15.6
2	50	25.8	81	57	55	8	59	16.4
2	51	13.0	81	40	15	8	59	16.3
2	51	57.8	81	23	50	8	59	17.9

Thermometer 34°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
2	58	40.8	92	59	40	8	59	15.6
2	59	32.3	93	20	50	8	59	16.6
3	00	24.0	93	42	35	8	59	16.4
3	01	19.5	94	06	55	8	59	13.7 rej.
3	02	12.5	94	28	30	8	59	15.2
3	03	31.2	95	00	55	8	59	16.6
3	04	19.3	95	21	05	8	59	16.5
3	05	16.8	95	44	50	8	59	17.2
3	05	58.5	96	03	20	8	59	14.8

Thermometer 36°.

Mean of 17 observations, 8*h.* 59*m.* 16.46*s.*

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APPENDIX No. 5—Continued.

December 2, 1846.—Camp 114, "Warner's."

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	11	12.8	69	09	55	33	17	21
3	12	11.8	69	09	10	33	16	40
3	13	33.5	69	09	25	33	16	29
3	14	51.5	69	10	55	33	17	00
3	16	28.9	69	11	35	33	17	09
3	17	51.0	69	12	10	33	17	09
3	18	35.8	69	12	10	33	16	47
3	20	31.0	69	12	50	33	16	49
3	21	03.8	69	13	25	33	16	58
3	21	52.0	69	13	40	33	16	58
3	22	23.8	69	13	55	33	16	59
3	23	13.0	69	14	10	33	16	59

Thermometer 64°.

Mean of 12 observations, 33° 16′ 57″.

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APPENDIX No. 5—Continued.

December 8, 1846 —*Camp* 118, *San Bernardo.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Lyræ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min*	*sec.*	*h.*	*m.*	*s.*
3	19	08.0	62	19	00	8	59	41.2
3	20	28 8	61	49	25	8	59	40 8
3	21	20.2	61	30	20	8	59	40.4
3	22	17.9	61	09	30	8	59	41.6
3	22	59.5	60	53	55	8	59	40.7
3	23	46.2	60	36	35	8	59	40.4
3	24	34.7	60	19	25	8	59	39.3
3	25	28.8	59	59	20	8	59	41.5
3	26	06.8	59	44	60	8	59	40.5

Thermometer 40°.

Time, p. m.			Double altitudes of *a* Arietis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	34	46.0	117	46	30	8	59	36.9
3	35	41.8	118	09	15	8	59	37.5
3	36	32.8	118	30	15	8	59	37.6
3	37	13.8	118	47	35	8	59	36.5
3	38	13.8	119	12	35	8	59	35.8
3	38	59.6	119	30	30	8	59	38.1
3	39	40.0	119	47	25	8	59	37.5
3	40	34.7	120	09	30	8	58	38.5

Thermometer 40°.

Mean of 17 observations, 8*h.* 59*m.* 38.95*s.*

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APPENDIX No. 5—Continued.

December 8, 1846.—*Camp* 118, *San Bernardo.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
3	44	15.0	69	01	30	33	03	49
3	45	10.0	69	01	50	33	03	45
3	45	45.5	69	02	00	33	03	46
3	46	32.2	69	02	00	33	03	40
3	47	10.8	69	02	10	33	03	41
3	48	00.8	69	02	30	33	03	45
3	48	34.6	69	02	40	33	03	46
3	49	25.8	69	02	35	33	03	38
3	50	04.0	69	02	30	33	03	32

Thermometer 40°.

Mean of 9 observations, 33° 03′ 42″.

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APPENDIX No. 5—Continued.

December 15, 1846.—*Camp* 120, *San Diego.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Arcitis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	33	31.0	129	04	15	8	58	38.1
3	34	24.0	129	25	25	8	58	39.1
3	35	15.8	129	46	10	8	58	39.2
3	36	26.8	130	15	40	8	58	36.9
3	37	30.0	130	41	20	8	58	36.4
3	38	23.2	131	02	10	8	58	37.8
3	39	23.9	131	26	40	8	58	37.4
3	40	22.5	131	50	20	8	58	36.9

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Pegasi, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
3	52	26.5	123	38	45	8	58	41.6
3	53	43.8	123	11	55	8	58	41.2
3	54	42.8	122	50	55	8	58	42.0
3	55	34.7	122	33	10	8	58	40.9
3	56	25.0	122	16	45	8	58	44.2 rej.
3	57	22.3	121	55	40	8	58	41.6
3	58	13.0	121	37	40	8	58	41.3
3	59	04.5	121	19	40	8	58	41.9
4	00	05.2	120	58	10	8	58	42.1

Thermometer 50°.

Mean of 16 observations, 8*h.* 58*m.* 39.65*s.*

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APPENDIX No. 5—Continued.

December 15, 1846.—*San Diego.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
4	17	32.0	68	33	55	32	45	41
4	18	27.8	68	33	35	32	45	30
4	19	21.5	68	33	55	32	45	39
4	20	49.2	68	33	55	32	45	37
4	21	33.0	68	33	45	32	45	32
4	22	09.0	68	33	35	32	45	27
4	23	00.8	68	33	55	32	45	37
4	23	46.5	68	33	30	32	45	24
4	24	28.0	68	34	00	32	45	40
4	25	12.5	68	33	40	32	45	30
4	25	49.0	68	33	50	32	45	34
4	26	20.8	68	33	50	32	45	34

Thermometer 50°.

Mean of 12 observations, 32° 45′ 34″.

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APPENDIX No. 5—Continued.

December 16, 1846.—*San Diego.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Ceti, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
6	04	16.0	121	24	45	32	44	40
6	06	24.2	121	27	40	32	44	32
6	07	36.5	121	28	35	32	44	37
6	08	16.2	121	29	05	32	44	35
6	09	41.8	121	30	40	32	44	07
6	10	53.2	121	31	20	32	43	52
6	12	04.0	121	31	05	32	43	55
6	12	43.8	121	30	20	32	44	11
6	13	43.0	121	30	30	32	43	51
6	15	08.5	121	29	00	32	44	02
6	16	02.5	121	26	20	32	45	51

Thermometer 40°.

Mean of 11 observations, 32° 44′ 12″.

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APPENDIX No. 5—Continued.

December 16, 1846.—*San Diego.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of Aldebaran, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
4	40	14.0	90	52	50	8	58	24.7
4	41	04.8	91	13	30	8	58	25.6
4	41	41.2	91	29	35	8	58	23.1
4	42	30.5	91	49	25	8	58	24.7
4	43	19.8	92	10	00	8	58	24.1
4	44	17.5	92	33	15	8	58	25.6
4	45	25.5	93	01	35	8	58	25.1
4	46	29.5	93	29	15	8	58	22.1 rej.
4	47	27.2	93	52	15	8	58	21.7 rej.

Thermometer 50°.

Mean of 7 observations, 8*h.* 58*m.* 24.70*s.*

Time, p. m.			Double altitudes of ——— in the west.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*
5	27	32.5	104	32	40
5	28	15.2	104	14	45
5	29	03.8	103	55	10
5	29	43.5	103	37	55
5	30	29.6	103	18	15
5	31	11.0	103	01	15
5	32	10.5	102	36	50
5	33	40.3	101	58	20
4	35	21.6	101	16	10
5	36	09.8	100	56	10
5	37	06.5	100	32	30

Thermometer 50°.

APPENDIX No. 5—Continued.

December 19, 1846.—*San Diego.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of sun's upper limb.	
h.	*m.*	*s.*	*Deg.*	*min.*
11	23	04.8	48	00
11	24	26.0	47	40
11	25	05.8	47	30
11	25	43.7	47	20
11	26	22.5	47	10
11	27	01.5	47	00
11	27	38.0	46	50
11	28	19.8	46	40
11	28	55.7	46	30
11	29	31.5	46	20

Thermometer 64°.

DETERMINATION OF INDEX ERROR.

	Min.	*sec.*	*Min.*	*sec.*
On the arc..................	32	15	31	55
Off the arc	32	25	32	40

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APPENDIX No. 5—Continued.

December 19, 1846.—*San Diego.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of —— in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	11	05.2	114	03	10			
6	12	09.0	113	36	25			
6	12	52.0	113	18	15			
6	13	35.8	112	59	35			
6	14	25.0	112	39	30			
6	15	17.5	112	19	50			
6	16	10.5	111	57	30			
6	17	24.0	111	25	30			
6	18	22.5	111	01	05			
6	19	54.0	110	23	00			

Thermometer 50°.

Time, p. m.			Double altitudes of *a* Orionis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	29	36.8	97	07	30	8	57	49.5
6	30	36.6	97	29	05	8	57	50.3
6	31	21.2	97	45	15	8	57	50.5
6	32	10.0	98	04	05	8	57	47.4
6	32	56.5	98	19	50	8	57	51.5
6	33	39.8	98	35	05	8	57	51.6
6	34	28.5	98	53	15	8	57	50.0
6	35	15.8	99	08	55	8	57	53.7
6	36	00.8	99	25	30	8	57	52.8
6	36	39.8	99	40	25	8	57	50.2

Thermometer 50°.

Mean of 10 observations, 8*h.* 57*m* 50.75*s.*

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APPENDIX No. 5—Continued.

December 19, 1846.—*San Diego.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Ceti, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
5	53	16.0	121	27	10	32	44	18
5	54	38.5	121	29	45	32	43	48
5	55	44.0	121	30	30	32	43	48
5	56	30.5	121	30	45	32	43	53
5	57	26.8	121	31	00	32	43	57
6	00	32.5	121	32	10	32	43	15
6	01	16.5	121	32	20	32	42	59
6	02	02.8	121	31	50	32	42	59
6	02	58.0	121	30	40	32	43	10
6	03	42.8	121	39	20	32	43	26
6	04	51.5	121	27	25	32	43	40

Thermometer 50°.

Mean of 11 observations, 32° 43′ 31″.

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APPENDIX No. 5—Continued.

December 20, 1846.—*San Diego.*

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of Polaris.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*
6	30	15.2	67	58	35	32	45	44
6	31	04.8	67	58	20	32	45	49
6	31	51.5	67	57	50	32	45	45
6	32	35.0	67	57	10	32	45	36
6	33	10.8	67	56	55	32	45	37
6	36	51.5	67	55	10	32	45	37
6	37	40.1	67	54	50	32	45	40
6	38	21.5	67	54	10	32	45	30
6	39	09.8	67	54	05	32	45	39
6	39	49.8	67	53	25	32	45	30
6	40	50.0	67	53	05	32	45	34
6	41	32.5	67	52	35	32	45	31

Thermometer 45°.

Mean of 12 observations, 32° 45′ 38″.

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APPENDIX No. 5—Continued.

December 20, 1846.—San Diego.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of —— in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	03	15.5	115	36	20			
6	04	11.2	115	11	10			
6	04	51.5	114	55	45			
6	05	41.5	114	31	04			
6	06	26.5	114	15	50			
6	07	15.7	113	55	40			
6	08	13.2	113	31	50			
6	08	53.2	113	15	20			
6	09	32.8	112	58	18			

Thermometer 45°.

Time, p. m.			Double altitudes of *a* Orionis, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	15	16.8	93	18	55	8	57	43.0
6	16	18.3	93	41	25	8	57	44.5
6	17	02.0	93	58	40	8	57	42.0
6	17	51.5	94	16	30	8	57	43.5
6	18	40.0	94	34	50	8	57	42.8
6	19	30.0	94	53	40	8	57	42.1
6	20	23.8	95	13	50	8	57	41.3
6	21	17.8	95	33	45	8	57	41.6
6	22	05.5	95	51	10	8	57	42.0

Thermometer 45°.

Mean of 9 observations, 8*h.* 57*m.* 42.58*s.*

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APPENDIX No. 5—Continued.

December 21, 1846.—San Diego.

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	03	19.2	99	40	55	8	57	28.3
6	04	14.5	99	18	10	8	57	29.3
6	05	00.5	98	58	25	8	57	28.1
6	05	52.8	98	37	05	8	57	29.5
6	06	45.8	98	14	05	8	57	27.4
6	07	31.[illegible]	97	54	40	8	57	26.4
6	08	20.0	97	35	25	8	57	29.3
6	09	09.2	97	14	50	8	57	29.3
6	09	52.5	96	56	20	8	57	28.6

Thermometer 45°.

Time, p. m.			Double altitudes of *a* Orion, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	16	16.8	95	15	30	8	57	25.8
6	17	06.8	95	34	15	8	57	25.1
6	18	00.5	95	53	50	8	57	25.7
6	18	57.8	96	15	05	8	57	25.3
6	19	40.5	96	30	15	8	57	27.1
6	20	25.7	96	48	05	8	57	23.3
6	21	16.5	97	05	30	8	57	26.3
6	22	06.0	97	23	35	8	57	26.4
6	23	03.5	97	45	40	8	57	23.3

Thermometer 45°.

Mean of 18 observations, 8*h.* 57*m.* 26.90*s.*

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APPENDIX No. 5—Continued.

December 21, 1846.—San Diego.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Ceti, near the meridian.			Latitude.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min*	*sec.*
5	42	48.0	121	23	40	32	44	32
5	44	04.5	121	25	45	32	44	29
5	45	36.0	121	27	05	32	44	45
5	46	58.0	121	28	45	32	44	32
5	48	15.8	121	28	45	32	44	53
5	50	11.8	121	29	35	32	44	45
5	51	04.0	121	30	00	32	44	30
5	52	25.7	121	29	10	32	44	42
5	53	36.6	121	28	50	32	44	30
5	54	43.0	121	27	35	32	44	38
5	56	15.2	121	25	55	32	44	45
5	57	25.2	121	23	40	32	44	51

Thermometer 45°.

Mean of 12 observations, 32° 44′ 39″.

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APPENDIX No. 5—Continued.

December 23, 1846.—San Diego.

DETERMINATION OF LATITUDE.

Time, p. m.			Double altitudes of *a* Ceti, near the meridian.			Latitude.			
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*Deg.*	*min.*	*sec.*	
5	33	04.0	121	20	10	32	44	57	
5	34	05.5	121	22	45	32	44	38	
5	35	16.0	121	26	00	32	43	28	rej.
5	36	32.0	121	27	20	32	44	10	
5	37	15.0	121	28	00	32	44	15	
5	38	09.8	121	28	45	32	44	20	
5	38	51.8	121	29	05	32	44	26	
5	39	55.5	121	29	50	32	44	22	
5	41	06.5	121	29	50	32	44	34	
5	42	16.2	121	30	30	32	44	17	
5	44	23.8	121	30	20	32	44	03	
5	45	24.6	121	29	05	32	44	23	
5	46	24.8	121	28	20	32	44	17	
5	47	33.0	121	27	40	32	44	00	
5	48	35 7	121	24	40	32	44	46	
5	49	25.8	121	23	05	32	44	55	
5	50	24.5	121	22	40	32	44	15	
5	51	09.8	121	21	05	32	44	18	

Index error + 17.5″.

Thermometer 54°.

Mean of 17 observations, 32° 44′ 24″.

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APPENDIX No. 5—Continued.

December 23, 1846.—*San Diego.*

DETERMINATION OF TIME.

Time, p. m.			Double altitudes of *a* Andromedæ, in the west.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
5	54	56.5	99	41	10	8	56	58.0
5	55	33.0	99	26	10	8	56	58.7
5	56	16.8	99	07	25	8	56	57.7
5	57	08.5	98	46	15	8	56	58.9
5	57	58.2	98	26	10	8	56	60.4
5	58	54.6	98	01	50	8	56	58.9
5	59	52.8	97	37	20	8	56	58.5
6	01	23.8	96	59	15	8	56	58.5
6	02	10.0	96	39	40	8	56	57.8

Thermometer 54°.

Time, p. m.			Double altitudes of *a* Orion, in the east.			Chronometer fast.		
h.	*m.*	*s.*	*Deg.*	*min.*	*sec.*	*h.*	*m.*	*s.*
6	06	25.5	94	42	45	8	56	54.8
6	07	17.5	95	01	45	8	56	54.3
6	08	02.5	95	18	35	8	56	55.1
6	08	57.6	95	38	35	8	56	55.9
6	09	47.8	95	56	10	8	56	58.6
6	10	25.2	96	10	35	8	56	56.9
6	11	02.0	96	23	25	8	56	58.7
6	11	55.6	96	43	45	8	56	56.59
6	12	43.5	97	01	20	8	56	56.7

Thermometer 54°.

Mean of 18 observations, 8*h.* 56*m.* 57.52*s.*

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APPENDIX No. 6.

WASHINGTON CITY, *October* 8, 1847.

SIR: I have the honor to submit, herewith, a report of such objects of natural history as came under my observation while I was attached to the topographical party, under your command, during the journey from Fort Leavenworth to Bent's Fort.

The plants which were collected were submitted to the inspection of Dr. Torrey, to whom I am indebted for their names.

With great respect, I am, sir, your most obedient servant,

J. W. ABERT.

Lieutenant U. S. Top. Engineers.

To. Lieut. W. H. EMORY,
U. S. Topographical Engineers.

Notes of Lieutenant J. W. Abert.

On the 27th of June, 1846, we set out from Fort Leavenworth. The day was clear and bright; the woods were rejoiced with the voice of the mocking bird, and of the many little warblers that would join in the chorus of his song; the bluebird was there with his sprightly notes, and the meadow lark, perched on some tall mullein weed, caroled forth his song of love. As we were heartily tired of remaining quiet, we were well prepared to enjoy the beautiful scenes that our progress gradually developed. The ground is what is called "rolling prairie," of gentle curves, one swell melting into another.

The soil around is extremely rich; the whole country is verdant with the rank growth of the "tall grass," as it is called by way of eminence, when compared with that which grows beyond the region of the walnut and the hickory.

Here are many varieties of useful timber: the hickory, the walnut, the linden, the ash, the hornbeam, the maple, the birch, and the beech, also the cotton wood; but, beyond the limits of the "tall grass," there is the cotton wood only.

Five miles from Fort Leavenworth we passed a large butte, called "Pilot Knob;" its top is flat, and unites with the vallies below in a curve like that of a rope slackly drawn; spreading over the valleys, and climbing almost to the top of the butte, we saw fine forests of timber, consisting chiefly of oak. Among the shrubs, we noticed the hazel, (corylus Americanus,) and the button bush, (cephalantus occidentalis;) among these the wild grape had twisted

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its tendrils and was growing so luxuriantly that it was with great difficulty one on horseback could force his way through.

On the hill sides, the wild rose was still in bloom, and mingled its pink flowers with the beautiful white clusters of the Jersey tea, (ceonothus Americanus.) The prairies were covered with tall stalks of the rattlesnake weed, (rudebeckia purpurea.)

Some of our mules proved very refractory, but we soon conquered them with the aid of the "lazo," or cabriesto, as it is often called—a rope of hair, or plaited hide, 50 to 60 feet long, in which a noose is formed that, by a skilful hand, is easily thrown over the mule's head, the noose being gradually tightened, the animal soon falls to all appearance lifeless. Now, the bridle, the saddle, and packs are fixed, the noose loosened, and the mule rises ready for the journey.

After a march of twelve miles, we encamped near a log house, close to a fine spring of cold clear water. Here we noticed the white hickory, or downy hickory, (juglans pubescens,) the chestnut oak, (quercus primus acuminata,) the spicewood, (laurus benzoin,) and, deep in the woods, the modest May apple, (podophyllum peltatum,) and bloodroot, (sanguinaria canadensis.)

As we retired to rest, the sky became cloudy, and in a little time a plentiful shower of rain fell, which annoyed us greatly as it drove through our tents.

28th.—During the early portion of the morning, the rain continued with some abatement, and, as the sky showed signs of clearing off, we commenced making our arrangements for the march. I went down to a log house close by, and, whilst examining it, was attracted by the chirping of birds, and, on searching, found that the sound proceeded from the chimney, and I there discovered a beautiful nest, in the shape of a half basket, firmly attached to the chimney walls with clay, lined internally with horse hair and soft grass, and covered externally with moss; within were five unfledged birds, their eyes scarcely open, and at every sound they heard they would open their mouths and scream for food. The anxious parent several times darted down near my head. I wished much to ascertain its species, but, although it lit on the trees near the house, I could not get near enough to make any decision, and, as I did not desire to kill a bird with young, I had to content myself with the name some of our people gave it, to whom I pointed it out, and who called it the "grey bird."

After some little trouble with the mules, we got off about 7 o'clock; the rain had made the roads slippery, and the wheels cut into the soft mould so that the mules labored hard; at length we reached a sudden rise, where, in spite of our efforts, we were obliged to remain until one of the volunteer teamsters, seeing our difficulty, kindly brought us three yoke of oxen, and soon drew us up the slope. Passing on over gently rising and falling swells and vallies, with the delightful breeze that one almost always meets on the prairies, we felt our spirits rising with the clearing away of the clouds, and when the sun broke forth in splendor the sensation was truly exhilirating. Whenever we rode to one side of the

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road, we noticed that our horses would frequently sink to the fetlock, and saw on the ground little piles of loose earth, like small ant hills, being about 5 inches high and 10 or 12 inches in diameter at the base, and without any opening; they are formed by the sand rats or gophers, (pseudostoma bursarius,) and although their habitations cover the prairies, there are few persons I have met with who have ever seen them.

On our route we started several prairie chickens, (tetrao cupida.) After a march of 11 miles we reached Stranger creek, a romantic little stream of water, clear as crystal, that ripples over a pebbly bottom. The banks are high and composed of rich loam that nourishes immense oaks and sycamores, (platanus occidentalis.) The banks were now so slippery from the rain, and so steep withal, that we were necessitated to unload our wagons before we could achieve the ascent. We were soon encamped, and had our bedding exposed to the sun to dry. We noticed a great quantity of the orange colored asclepias, (asclepias tuberosa,) around which gaudy butterflies were flitting. The low grounds near us were covered with a prickly button-head rush, (eryingium aquaticum,) the roots of which, when candied over, formed the kissing comfits of Falstaff.

The woods were skirted by a dense growth of hazel, plum trees, and tangled grape vines. Here, too, we found the little quail, (ortix virginiana,) suddenly rising up from under our feet, and startling us with the whizzing sound of its wings. This evening the mosquitoes were very numerous, and we lay down to be tormented by these provoking pests; but few of us were able to sleep, although none of us slept very comfortably last night.

29th.—Yesterday evening, we found that the hind axletree of our wagon had been split in crossing the creek; and, being fearful lest we should break down at some place where good timber could not be obtained, we sent out two men to procure a piece of timber, and they soon brought in a fine piece of hickory, dragging it into camp by the means of a "lazo" that they had affixed to it and had then passed round the neck of a mule. Luckily for us, there was a good carpenter in the volunteer camp, and although his tools consisted only of a saw, an axe, a drawing knife, and an auger, he, nevertheless, managed to fashion a very good axletree. This work detained us until 1 o'clock, when we started for the Kansas river, having, through the kindness of Colonel Ruff, obtained a new teamster in place of the one who deserted last night.

The prairie was yet what is called rolling; the flat bottoms were covered with the rosin weed or polas plant, (silplicum laciniatum,) whose pennate-parted leaves have their lobes extending like fingers on each side of the mid rib. It is said that the planes of the leaves of this plant are coincident with the plane of the meridian; but those I have noticed must have been influenced by some local attraction that deranged their polarity.

The orange colored asclepias, (A. tuberosa,) and the melanthium virginicum, a white-flowering bush, were also abundant.

The timber on the ravines consisted of the white oak, (Q. alba,)

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black jack oak, (Q. ferruginea,) mulberry, (morus rubra,) walnut, (F. nigra,) the hickory, the red bud, (ericis canadensis.) The nettles (urtica canadensis) had grown to the height of 7 or 8 feet, all of which show the prodigal fertility of the soil.

As we approached the Kansas river its tributaries seemed to multiply rapidly, and the rolls in the prairie became more abrupt.

At 3 o'clock, we ascended a high ridge that gave us a fine view of the whole surrounding country. Presently reaching a little stream, whose banks were excessively steep and slippery, the wagons attempted to ascend; but one of the wagon wheels sank deep in the mud, and completely stopped all progress; we were therefore obliged to unload everything, and then clap all hands to the wheel, when we rose the hill amid the cheers of the men. A Frenchman, mounted on a wild mule, had already crossed and was standing on the western bank, which is 10 or 12 feet in height, when the mule suddenly sprung off the bank into the creek, just grazing with its feet the head of one of the men over whom it passed in its desperate leap. No one was hurt, and the Frenchman still sat as firm as ever.

As we neared the Kaw or Kansas river, some of us went in advance and soon reached an Indian house; the occupants said they were Shawnees. They appeared to be very comfortably fixed; had plenty of fine looking cattle, pigs, and chickens; within a few yards of the house, a clear stream of good water spouted forth from the side of a hill. We learned of the Indians that the distance to the Kaw river was 1½ miles.

Crossing a high ridge, we enter the Kanzas bottom; it was overgrown with a tall grass (arundo phragmites) from 5 to 6 feet high, and mingled with this was the long-leafed willow and the cotton wood. A quarter of a mile from the river bank, we entered the timber, consisting of the varieties already mentioned; the ground on which it grew was a deep loose sand difficult to get through.

In the river we found two large flat boats or scows manned by Shawnee Indians, dressed in bright-colored shirts, with shawls around their heads. The current of the river was very rapid, so that it required the greatest exertions on the part of our ferrymen to prevent the boats from being swept far down the stream. We landed just at the mouth of the Wakaroosa creek. Here there is no perceptible current; the creek is 14 feet deep, while the river does not average more than 5 feet, and in several places is quite shoal.

It was nearly 10 o'clock before all our company had crossed, and was so dark that we could scarcely see to arrange camp; so we lay down on the river bank and sent our horses out on the prairie to graze. We finished our suppers at 12 o'clock and lay down again to sleep; but, worn out as we were, the mosquitoes showed us no compassion, and large hooting owls, (bubo virginianus,) as if to condole with us, commenced a serenade.

The pure cold water of the Wakaroosa looked so inviting that some of us could not refrain from plunging beneath its crystal surface; one of the flat boats formed a convenient place from which to spring. The sun was rising, surrounded by golden clouds; in

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one of the flat boats, three of the Indians who had assisted in ferrying us over were soundly sleeping, and far away stretched the gradually diminishing trees that overhung the Kanzas water; the kingfisher (alcedo alcyon) was darting along, uttering his shrill rattling scream; flocks of paroquets (centurus Carolinensis) were circling over head, screaming and darting amid the tall walnut and sycamore trees.

We now made ready for our march, having engaged a fine looking Indian lad to go with the party. Our horses had not had much time to eat last night, and seemed disinclined to pass through the luxuriant grass that lay on each side of our road, and were constantly trying to snatch a mouthful of the delicious herbage.

At 8¼ o'clock we had a glimpse of the Wakaroosa buttes; on our right there was a large corn field, of about 30 acres, then a line of timber stretching as far as the eye could reach; on our left lay the broad rolling prairie, and directly in front we could see the road crossing the swells of the prairie, until it could be no longer distinguished. As we continued to advance we found that our road lead us directly between the two buttes.

We soon reached them, and then saw the "divide" that separates the waters of the "Wakaroosa" from those of the "Alaris des cygnes," or Osage; (as it is called near its mouth;) upon this divide the Santa Fé road is laid out.

We soon saw the Oregon trail, which here unites with that to Santa Fé; shortly after passing the junction of these trails we reached a steep declivity that forms the bank of a small stream, and noticed that the Indians had been working here for coal; in the superincumbent shale we found traces of fossils resembling the broad flat leaves of the iris (fridæ.) While we were examining this formation, my horse, that had been driven almost mad by the flies, (tabani,) broke from his fastenings and rushed into the creek, in order to roll in the water, and thus free himself from his tormentors; what a misfortune! for my saddle and pistols were on his back; some of the party dashed towards him, and, springing up, he galloped off, scattering all my accoutrements on the road; but I recovered every thing, even my pistols.

We continued on over a broad flat-bottom of marshy land, but found, before we had proceeded far, that our course bore too much to the north. We, however, continued to follow on in hopes it would take a turn, but were disappointed. As it was now late, we encamped on the Wakaroosa river, having marched nine miles. During the day, our animals suffered greatly from the horse-fly, (tabani;) these flies completely covered the necks and shoulders of the horses and mules, tormenting them excessively.

Amongst the birds observed this day, were the dove, (ectopistes Caroliniensis;) the flicker, (gieus auratus;) the blue bird, (sialia Wilsonnii;) the bunting, (pipilo erythrossthalmus;) and the crow, (corvus Americanus.) The last mentioned birds were lounging near a large cornfield, and were, doubtless, watching with interest the ripening of the grain.

Those friends of the prairie voyageur, the cow-bird, (molothrus

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pecoris,) made their appearance, and no sooner had we picketed our animals than those birds installed them on their backs.

The elder (sambucus pubescens) was still in bloom, and the orange asclepias still displaying its gaudy flowers, much to the delight of the brilliant butterflies that sported around it, and are so constantly found near it, that it is often called the butterfly plant.

Our camp is on a high point which separates the branches of a little stream; the grass around is good, and our situation high, and must bid defiance to the mosquitoes. Along the margin of the creek I found a beautiful lily, (lilium tigrinum,) of a bright orange color, and beautifully dotted.

On *July* 1 we arose early and made our way back to the trail we had left. After a march of three miles we reached the route sought for; we then rose to the top of the "divide," which unites with the Wakaroosa valley by a series of slopes that resemble the exterior slopes of parapets, their crests changing direction suddenly, so as to form sharp angles like those of a bastion; we ascended 15 feet, and on taking a bearing back, found that the Wakaroosa buttes were north 40° east.

After travelling three miles further, we reached the broad trail of the traders from Independence, Missouri, to Santa Fé.

As our horses moved through the grass, the horse-flies seemed to be shaken from the spikelets, as the farina from the stamens of corn, when shaken by the wind; then rising up, they covered the heads and necks of the poor animals, making them frantic with pain; they would rub against each other, and stamp their hoofs; and some would place their heads so as to get the benefit of the switchings of another's tail; and even the riders were annoyed by their desperate efforts to get rid of these persecutors.

Before we had proceeded far, we met a man driving an ox team; he had accompanied some of the volunteer companies to carry provisons; and, having emptied his wagon, he was now on his return. He told us that it was twenty miles from the next pool to water, so we determined to camp soon; and, having made a march of eleven miles, we pitched our tents on the very same spot on which we had encamped one year previous. Here we collected some beautiful flowers, amongst which were the rudbeckia hirta, and the delicate bed straw, (galium tinctorum.)

The stream upon which we were was then merely a line of unconnected pools. The only trees to be seen were some tall elms, (ulmus Amer.,) in whose tops several turkey vultures (cathartes aura) were preparing to go to roost, while below, amongst the willow brush that bordered the stream, some cat birds (orpheus carol.) kept up a low conversation as they plunged into the inmost recesses of the undergrowth.

July 2.—As we had the twenty mile stretch to make to-day without water, we arose early. The dew last night had been very heavy, and we found little pools of water standing on the tops of our mosquito bars, for we had been obliged to desert the tent where our bars could not be fixed conveniently.

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The mounds made by the gophers or sand rats were more abundant than heretofore, and in several places a number of these mounds had been made so close together that the distinctness of each was completely lost in the mass, covering an area of five or six feet.

Our road was full of plovers, (charadicus marmoratus;) they would run along before us with great rapidity; then stop until we approached quite close, when they would run off again. Thus they kept travelling before us all day. We shot several of them, and I preserved some of their skins, more as a memento of the prairies than as a curiosity, for these birds are very abundant in the United States, from Canada to the gulf of Mexico.

As we proceeded on our journey, we heard the confused hum of thousands of grasshoppers, now and then broken by the chirping of the cricket. These insects are found in great abundance, and obtain greater size than any I have seen elsewhere. I got a cricket this morning that measured 1½ inches in length of its body.

We now entered on the level prairie, where nothing was to be seen but a wide expanse of green grass, and the sky above filled with cumulus clouds, the shadows of which, as they fell upon us, added to the refreshing effects of the delightful breeze one generally meets upon the the prairie. After travelling a long distance over a country, the irregularities of which were so imperceptible that one almost doubted their existence, we reached that position which I took to be the top of the divide. Here lay the half devoured carcass of an ox that had, doubtless, succumbed to the fatigues of the journey and deprivation of water; for these animals suffer much more from want of water than the mule. Some turkey vultures, sailing above our heads, showed that they were not ignorant of the locality of the carrion.

In a little while after passing the ox's carcass, we reached 110 mile creek, which is 22 miles distant from our last night's camp. At this creek there is a fine grove of timber, containing all the varieties found in the vicinity of Kansas river.

About 12 o'clock we reached this creek, and we here found the robin, (turdus migratorius,) the cat bird and the blue bird; and, high above us, the swallow-tailed hawk (nauclerus fuscatus) was sweeping round in graceful circles, its white head glancing in the sunlight. I asked the Indian lad to shoot it for me with his rifle; but he gazed upwards at the bird, and seemed so struck with the beauty of its movements that he uttered not a word, but shook his head to signify that the bird was too fair for him to kill it. I should think it impossible for smaller birds ever to escape this hawk, which unites the form and swiftness of the swallow with the boldness and strength of wing of the falcon.

Nigh the banks of the stream there was a low piece of ground covered with the purple monarda, (monarda allophylla.) The gaudy butterflies that I have spoken of before, as flitting around the asclepias, were now sucking the sweets of these flowers.

Before we had fairly pitched our tents, young Mr. Nourse, of Washington city, entered our camp. He had, alone, boldly set

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off from Fort Leavenworth the day after we had left, determined to overtake us. We were delighted at his safe arrival; nor were we less pleased when we found that he had brought letters from the friends and relatives whom we had left behind.

July 3.—We arose early this morning to gain as much of the cool portion of the day as possible, determined to push on and see if we could not get rid of the flies that are so troublesome to our horses. The poor brutes seem to have no time to graze; and, when picketed out, they employ their feeding time in rolling in the grass and kicking frantically, so that the ground resounds with the stamping of their hoofs; and, in taking observations with the aid of the artificial horizon, one is obliged to select a spot at some distance from the horses, to prevent the jar which they produce from disturbing the surface of the mercury. The season appears to be unusually dry; 110 mile creek, which at this time last year was full of water, now has only a few scattered pools in its bed.

All day we had a brisk breeze from the southwest, making the travelling very pleasant. The plover and cow birds were playing along the road in front of us, and catching the grasshoppers that were scattered around in unlimited profusion.

At 10 o'clock, having marched 15 miles, we reached Independence creek, so called by Colonel Frémont, in consequence of our encamping here on the 4th of July, one year previous. This creek contains the only running water we have seen since leaving our camp by the Wakaroosa river. Along the road side, I gathered a plant called lamb's quarter, (chenopodium album,) the plaintain weed, (plantago major,) and a beautiful sensitive plant, with a yellow flower, slightly resembling the violet, (cassia chamaecrista.)

We encamped seven miles beyond Independence creek, in a ravine timbered with the elm, the cotton wood, the hickory and the oak. Some of our hunters went out and killed several wild turkeys, (meleagris gallopaoo.) We saw a flock of curlew, (numenius longirostris,) and some teal, (anas carol.)

Saturday, *July* 4.—At 5½ o'clock, this morning, we crossed the creek upon which we had encamped, and soon reached an elevated piece of ground, from whence we could see our road crossing a high ridge in a direction S. 60° W. Whilst prosecuting our march we noticed two distant spots in the horizon; and, as we neared them, we judged, from the white light that one of the objects reflected, that they might be mounted men. Before long we met them, and found our conjectures correct. They said they were traders, and had been as far as Council grove.

At 7 o'clock, we crossed a stream of running water; at 8 o'clock, we reached one composed of pools, its banks heavily timbered with walnut, and we also noticed the buckeye, (pavia lutea,) and, skirting the stream, gooseberry bushes, (ribes triflorum,) and elder. At 12 o'clock, we reached Rock creek. This stream is very appropriately named, as its banks chiefly consist of rock. Near where the road crosses there is a large pool from four to five feet in depth, forming a fine bathing place; but we did not stop here, as we were anxious to reach some eminent place in honor of the day. We

pushed forward for "Big John spring," which we reached at 5 o'clock. Here we luxuriated on the delightful cool water of this celebrated spring, reclining under the shade of a tall oak "sub tegmine querci," at whose base this spring originates; the temperature of the water being only 53°, while that of the air ranges above 80°.

We saw to-day two beautiful varieties of the evening primrose, (œnothera biennis,) the white and the yellow. We noticed amongst the birds the brown thrush, (orpheus rufus,) the king bird, (muscicapa tyrannus,) the grouse (tetrao cupido,) and the little quail.

Sunday, July 5th.—We wished, as we started this morning, that we could have taken this spring along with us, the water was so beautifully clear and so cold, and the spring shaded from distance around by a grove of the walnut, the sycamore, and the oak, around the trunks of which the ivy (rhus radicans) clambered, and at the roots of which grew beautiful lychnis.

Two miles from our point of departure is Council grove, where there is a fine stream of running water, and great quantities of quartz and highly fossiliferous limestone.

Shortly before Council grove, we passed the grave of a white man, who had been murdered by an Osage Indian; a circular pile of stones marks his resting place; from the crevices between the stones the ivy has shot forth; over the grave a long pole leans mournfully. When I viewed this simple grave, my mind turned to the proud monuments which are built up by the wealthy in our great cities, and which are daily leveled with the ground to give place to some improvement. Here, on the wild prairie, the Indian and the rude hunter pass by this spot, and not for worlds would they remove one stone.

Continuing our march, we travelled over a distance of 20 miles, when we reached "Diamond spring." This is a fine large spring, of three or four feet across, the water extremely cold; the temperature of the spring is 54°, while that of the air, the thermometer in the shade, is 87°

I procured at this place a beautiful white thistle, (cnicus acarna,) of delicious fragrance. We saw a great many night hawks (chordeiles virgins) and plovers, as well as several herds of deer, (cervus virginianus.) I also collected some of the great grasshoppers of the prairies.

Monday, July 6th.—As we set out on our march, the wagon mules took a freak in their heads and endeavored to run off with the provision wagon, but the driver turned them into the wide prairie, and soon succeeded in quieting them for a time, but he had several trials for the mastery before the day's march was over. After travelling 15 miles, we arrived at "Lost spring," but did not stop as its appearance was not inviting.

We noticed near the road numerous large puff balls or fungi, that resembled, both in size and appearance, human skulls of most beautiful whiteness; the under side is puckered as if a napkin had been thrown over a round body and drawn with a string; the interior resembles flour, except that it coheres.

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Continuing our journey, we pressed forward rapidly, in order to reach Cottonwood fork, which is nearly thirty miles from the place where we were encamped this morning. We had a tedious march and did not reach the creek until 3 o'clock.

Our animals were very much jaded, and add to this that, the moment we reached our goal, myriads of horse flies attacked our cavalcade furiously. In the efforts of the beasts to rid themselves of the flies, they often became entangled in the "cabrestoés;" we were obliged to protect some of them by loose clothing; the mosquitoes, too, were troublesome to horses and riders.

Cottonwood fork is a tributary of the Neosha, as well as Council grove creek and the waters intermediate. This stream is timbered with large cotton wood trees that keep a continued rustling of their leaves, for the slightest breeze makes them tremble.

We noticed here thickets of the elder (S. canadensis) in full bloom. The beautiful monarda (M. allophyla) covered the low portions of the banks of this stream, while on the little sand bars, and close to the water's edge, a dense growth of the long leaved willows overhung the clear water, in which sported the black bass, the cat fish, and the sun fish. Just where the road crosses, there is a fine pool of water, from five to six feet deep and twelve feet wide.

Tuesday, July 7.—We concluded that it would be best to remain here for the day, as our animals looked much harrassed by what they have already undergone. We employed ourselves in getting all our affairs arranged in complete order; for we expect that this is the last stop that we shall make for some time to come. Everything was overhauled, our clothes were all washed, and all those arrangements, such as a journey of this kind suggest, but which our continued movement did not permit us to accomplish, were this day executed.

Around our camp the ground looked golden with the different varities of the golden rod, (solidago,) and along the stream we saw box elder, (acer negundo,) and extended thickets of plum bushes.

Not far from the camp we saw some antelope, (dicranocerus furcifer,) so we sent out an old voyageur with the Indian hunter in pursuit of them; but they returned unsuccessful, and reported that the antelope were extremely shy.

About 4 o'clock several companies of volunteers made their appearance, and until it was quite late we heard the tramp of horses, the clashing of sabres, and jingling of spurs; at last they all arrived, and the camp was quiet, save the howl of the sentinel wolf.

Wednesday, July 8.—At 5 o'clock this morning we were on the route for the Turkey creeks; they are three in number, and unite a few miles below the points where our road crosses them; the day was pleasant, for the sky was overcast.

We had now reached the short grass, that is not more than four or five inches in length, and we saw little patches of the true buffalo grass, (sesleria dactyloides,) a short and curly grass, so unique

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in its general character that it at once catches the eye of the traveller.

On either side of us we observed little circular spots marking the places where the buffalo once wallowed; for these huge animals have a habit of throwing themselves on their sides upon the ground; they then commence walking, as it were, with their feet on the circumference of a circle; this causes their bodies to revolve, and thus result circular depressions in the prairies; these, after a rain, are for a long time filled with water, with which the traveller is often fain to slake his thirst.

These old wallows are now overgrown with plants that grow more luxuriantly than on other portions of the prairie. There is the splendid coreopsis (coreopsis tinctoria) and the silver margined euphorbia; (euphorbia marginata;) these at once arrest the attention.

It is seldom, now, that the buffalo range this far; no signs of old excrements are to be seen, and the bleached bones left upon the plains by the hunter have long since mouldered away. Towards the close of the day we found the frontal bone of a buffalo's skull, the only sign, in addition to the wallows, of this animal having been once abundant.

Along the road were numbers of the beetle, laying in their winter-stores, "haud nonignari aut incauta futuri." We stopped to noon, at 11½ o'clock. After a halt of half an hour, we started again, and at 12½ o'clock, formed our camp on Turkey creek. Here not a stick of timber is to be seen, but we found some beautiful plants with brilliant scarlet flowers (malva pedata) and roots which are eatable. We also obtained specimens of the pomme blanche, (psoralea esculenta,) and in the waters of Turkey creek we caught some sun perch and catfish.

The men killed several rattlesnakes near our camp, and one a grey snake, marked with a row of blackish spots along the back; it is said never to exceed two feet in length, and is called the grey rattlesnake. Before dark, the sky became black with clouds, whose appearance was soon followed by a heavy shower of rain.

This day, 9th, at daylight, we struck our tents and commenced our march; heavy clouds were at intervals passing over us and completely deluging us with rain. When the rain would cease, we would stop a few moments and let our animals rest. We noticed some buffalo skulls near the road; they must have lain here many years, as they were crumbling to pieces. At 3 o'clock we reached the Little Arkansas, a tributary of the great river the name of which it bears. This stream is from five to eight feet in width, and averages five inches in depth; on its banks were some large elms and box elder; we also saw the common elder, (sambucus,) narrow leafed willow, and the grape, (vitis aestivalis,) the sorel (oxalis stricta) and lamb's quarter, (chenopodium album,) grew near the stream.

The rain had ceased as we entered camp, and as the antelope appeared abundant and at no great distance, Menard was

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sent to shoot some of them, but his gun had got so wet during the day it would not fire.

We noticed to-day the pink sensitive plant (schrankia uncinata) of most delicious fragrance, so that my hat, into which I had thrust some specimens, was pleasantly perfumed. With this plant, we also found a white variety, (darlingtonia brachypoda,) the flowers and leaves are smaller than the plant first mentioned, and has no odor.

Late in the evening several of the volunteer companies came up; they said they were suffering for want of provisions; as the commissary waggons had got on too far in advance, they sent forward to have some of them return. But we were all suffering from a cause that produced in some of us feelings more unpleasant than hunger; the blowfly had peopled our blankets with living masses of corruption; it is said that these insects were never before seen so far out in the prairies.

Friday, 10*th*.—It is still raining, the clouds are chasing each other rapidly across the sky, and now and then the rain pours heavily down. We remained in camp some time waiting for the rain to stop. We thus lost several hours, but we found travelling in the prairies rather increased the chafing of our animals. We noticed to-day some swallows, (hirundo bicolor,) also the turtle dove, the little quail, the blue jay, (garulus cristatus,) and the king fisher (alcedo alcyon.)

We collected some lamb's quarter and had it cooked, and noticed along the road side the purslane, (portulaca oleracea;) this also would answer for the table of the prairie voyageur. Our day's journey was 16 miles.

Saturday 11*th*.—We were up this morning at 3½ o'clock, and ready for the start. Our arrangement of mosquito bars was broken in upon last night by a heavy shower of rain that forced us to retreat to our tents.

After marching three miles, we reached Cow creek; it was very difficult to cross on account of the miry bottom, but we got safely over without great delay. Before we had proceeded far, we caught sight of the "plum buttes," bearing N. 20° W. We passed through a large village of prairie dogs, (Arctomys Ludoviciana;) although now deserted, there were fresh signs of the dogs having thrown out some earth from their excavations. Last night's rain had, doubtless, forced them to leave their houses. In the ponds that had settled on the plain, we saw several craw fish, and the crickets were gathered around some ant hills. As our wagons moved along the road, the lizards (lacerta lineatus) were darting rapidly along the ruts in front of it, anxious to escape being crushed. The common land turtle (testudo clausa) were also very abundant. As we got quite near the Plum buttes, we caught sight of the buffaloes, (bos americanus,) and some five or six of our party immediately gave chase. The buffaloes ran around in a circle of three-fourths of a mile in diameter; so those who were near the centre of this circle had an excellent view of the chase. Holster pistols were the only arms used, and we soon had the plea-

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sure of seeing one of the animals fall; the other then turned off into the wide prairie.

Near the buttes we collected some beautiful Gaillardias of different species. Gaillardia amblyodon and G. pinnatifida we found abundant over the remainder of our day's route. After a march of eight miles more we reached the banks of the Arkansas river, where we encamped. Here we found a large train of wagons, belonging to Messrs. Hoffman, of Baltimore.

Sunday, July 12.—We left the Arkansas and marched to Walnut creek, where we found Mr. Hoffman's party, they having started before daybreak. We here noticed the prairie gourd (cucumis perennis) and the cactus, (cactus opunta;) also the "pinette de prairie," or liatris pychnostachia, with a great abundance of the common sunflower, (helianthus annuus;) the bright scarlet malva (malva pedata) and the silver edged euphorbia, (E. marginata;) also the purslane, the convolvulus (ipomen leptophylla) rudbeckia hirta, and a species of cockle burr; and on all sides the little mounds of loose earth thrown up by the gopher, (psedostoma *brissarius.*)

We left Walnut creek at 3 o'clock, and entered upon vast plains of the buffalo grass, (sesleria dactyloides.) After a march of 11 miles we camped within five miles of the famed Pawnee rock. Our camp was a mile from the river; but we drove our horses to water and got our buckets filled. As there was no wood, we used the "bois de vache," and lay down near the smoke of the fires to avoid the mosquitoes. We had no sticks to support our mosquito bars. When we first arrived, the country around was covered with buffalo, but it was too late in the day to hunt; we therefore lay down quietly with the intention of having a fierce chase in the morning.

July 13*th*.—Last night we had a terrible serenade from a large drove of prairie wolves, (canis latrans.) These animals always hang on the heels of the buffalo, to pick up the infirm and those the hunters have wounded, as well as to prey on what is left of the slaughtered.

We got off in good time, and Lieutenaut Emory, in company of one of our hunters, started for the buffalo. We saw the chase; as the herd would divide, and let the horsemen pass through, we heard the rumbling sound of their many feet; but at last they crossed the bluff that extends towards the north from Pawnee rock, and were lost to our view. Lieutenant Emory killed one of the herd; but our hunter came into camp empty handed. We halted a short time to pack the buffalo meat, and then proceeded to Ash creek. This creek was dry, so we continued our route among herds of buffalo that were continually dashing across our road, and at length reached Pawnee fork after a march of 18 miles.

The waters of this creek were so high that we could not cross; the trees along the sides of the banks were half hidden; the whirling eddies were rushing along with great velocity; the willows that grew on the banks were waving under the strong pressure of the water, and brush and large logs were hurriedly borne along on the

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turbid bosom of the stream. We therefore camped by the side of the creek to await the subsiding of its waters. The country around was covered with the (cucumis perennis) prairie gourd, and we found it to be infested with those little striped insects that so much annoy the farmer in the United States, by the ravages they commit amongst the young vines.

This creek is timbered with the elm, (ulmus Americana,) and the box elder, (aceo negundo.) We frequently, during the day, noticed the purslane and the "pinette de prairie;" in the low grounds the splendid coreopsis and the euphorbia were displaying their beauties; and on the uplands the prickly pear was seen in great abundance, but it had passed its bloom.

During the afternoon a man by the name of Hughes was drowned in attempting to cross the stream; there were two men with him at the time, but the current was so violent that it soon swept him out of reach. His friends brought his clothes to our camp, where they left them until they could recover the body.

We saw to-day large flocks of the tropical or yellow-headed blackbird, (agelajus xantocephalus,) also the common blackbird, (quis calus versicolor,) and the Baltimore oriole, (icterus Baltimore.)

July 14th.—We were obliged to remain here all day, still waiting the pleasures of the waters. In the meanwhile I set one of the men to work to dig up a root of the beautiful prairie convolvulus, (ipomea leptophylla.) This man worked for several hours, for the ground was extremely hard, so that he was at last obliged to tear it up, leaving much of the top root behind. This root extended for about one foot and of not more than one-half inches in diameter, then it suddenly enlarged, forming a great tuber, 2 feet in length and 21 inches in circumference. The Cheyenne Indians told me that they eat it, that it has a sweet taste, and is good to cure the fever. They called it badger's food, and sometimes the man root, on account of its great size, for they say some of them are as large as a man. We also procured here the Mexican poppy, (argemone Mexicana;) noticed quantities of a willow brush, and several specimens of the tooth-ache tree, (near zanthoxylum fraxinum.) This morning Laing brought me a very large toad, (rana musica,) far exceeding any I ever before have seen. During the day I made a sketch of the country around our camp; the most recognisable feature is the bluff just on the west side of the stream, close to the ford.

In the evening some of us went over to visit Mr. Hoffman's camp; one of the gentlemen attached to the party had just returned from his first hunt, having killed four fat cows and brought in their tongues. Thus far we have noticed several plants that have been so common that I have neglected to mention them. One is the lead plant, or tea plant, (amorpha canescens,) and is in some places so abundant as to displace almost every other herb; the other is what our men call prairie indigo, (baptisia leucantha,) it bears a large black cylindrical pod, filled with kidney-shaped seed.

July 15th.—This morning we commenced making a raft, deter-

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mined to wait no longer, and by sundown had completed a raft of dry wood, capable of bearing 1,000 pounds without being overloaded. The men worked with great energy, and it was truly exciting to see them straddle the huge logs and float down in the rapid current whose waters were rushing along with such a fierce rapidity, dimpling the surface of the stream with miniature whirpools, and making the willows, now covered midway by the inundating waters, bend and spring as if moved by a hurricane. Sometimes rafts of brush and loose logs came rushing along, but the men stuck fast to the logs they bestrode, screaming out in wild excitement, as if to drown the gurgling sound of the wild waters.

To-day we saw several large white cranes with black-tipped wings; (grus Americanus,) and Laing killed me some rattlesnakes, (crotalus horridus) and several prairie snakes. Along the creek we found an abundance of plums (prunus virgins) and cherries.

Thursday, 16*th*.—As our raft was now completed we commenced crossing all our camp equipage, and by 11 o'clock everything was safely transferred to the south side of the stream. We were obliged to carry over much less at a time than we had hoped to have done, for our raft, built of the dryest wood that we could find, became water logged. The elm and box elder were the only trees we could get, and when green their specific gravity is but little less than that of water. The wagon body was placed upon the raft to distribute the weight that might be placed in it equably. A rope was stretched across on which a noose could slide, and this noose, by a long rope, was attached to our raft to prevent its being swept away in case the stretched rope should break. This precaution proved most wise, as the rope did break, but the knots upon it prevented the noose from sliding off, and our craft swung round into an eddy where it was comparatively calm.

We now proceeded to cross our cavalcade; some of the horses were first driven and went bravely over; others were very troublesome, but at length, seeing their companions enjoying the luxuriant grass, they all plunged in and arrived safe on the opposite side. Some had to struggle hard to get up the banks, that, in addition to their steepness, were covered with a thick coating of mud, deposited by the waters. It was a beautiful sight to see some of the finest of our horses spring from the high banks of the stream, to see the splash of spray as it showered around when the horse disappeared, and again to see the noble animal rise above the wave, snorting and dashing the waters from his mane, as he swam for the opposite shore. Our Indian lad seemed to enter into the spirit of the scene; he seized the cabresto of one of the wildest horses and dragged him down into the water; running out upon the raft, he stood for a moment, and then plunged into the stream, throwing his arms alternately as he dashed across. It is in such scenes as this that the Indians excel; their fine limbs, dark hair, and flashing eye lend all the imagination could desire to perfect the wild grace of motion, the picturesque of attitude that such occasions develope.

The water had fallen nearly 3 feet during the past night, and as it still continued to fall, the troops commenced crossing at the

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regular ford, which is one-fourth of a mile above us; but lost several of their horses. To-day, the man who was drowned yesterday was buried, his body having been found by our men engaged in rafting. His friends sent to us for his clothes in which to bury him; and, before the sun went down, he was deposited in his long resting place: "requiescat in pace."

At 11 o'clock, Colonel Doniphan came to our camp and informed us that General Kearny wished to see us. We afterwards learned that the general had some inquiries to make in regard to the route by the Smoky Hill fork; a route that Lieutenant Peck and myself had travelled when we were attached to the command of Colonel Frémont; but the roughness of that country, the absence of all roads, and the scarcity of water and wood, and the poverty of the pasturage, render the Arkansas river route much to be preferred.

At 3 o'clock we commenced our march, and soon struck a road that we pursued until near 10 o'clock at night, when we encamped near some pools of water, having been made aware of our approach to them some time before they were in sight, by the cry of the killdeer plovers, (charadrius vociferous.) We soon kindled our fires of "bois de vache," and then found we had camped in a prairie dog village; a bad place for picketing horses, as the neighborhood is generally destitute of grass. On our march we obtained a singular species of cactus, resembling roundish bodies covered with long protuberances, whose tips were crowned with stars of white spines, (near mammilarea sulcata.)

We saw during the day many skylarks; (alanda alpertris;) they allowed us to approach quite close before they took wing and as they flew through the air sang sweetly.

Friday, 17*th*.—We have now entered that portion of the prairie that well deserves to be considered part of the great desert. The short, curly buffalo grass (sesleria dactyloides) is seen in all directions; the plain is dotted with cacti and thistle, (carduus lanceolatus,) while only in buffalo wallows one meets the silver margined euphorbia; and in the prairie dog villages, a species of asclepias, with truncated leaves.

We saw several wild horses; in one group there were three, and with our spy glasses we had a fine opportunity for examining them. There was a bay, a roan, and a black; they stood for some time gazing at us as if completely absorbed in looking at the strange sight, when, as we approached, they raised their long flowing tails and dashed off with their long manes waving round their necks, and with a speed that soon carried them out of view. Unlike the mustangs, these looked to be large and beautifully proportioned.

Buffaloes seemed as if trying to surround us. We saw scarcely anything else far or near. The whole horizon was lined with them, and their figures would sometimes shoot up to an immense height, as their change of position caused the visual rays to pass through mediums of different refracting power, while seeming lakes would spring into existence, whose farthest shore seemed widely separated from us by the broad volume of water that intervened.

There were many dusky wolves (canis nubilus) prowling around

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the buffalo; the latter paid no regard to them, but let the wolves approach without showing the least repugnance, although the wolves devour the young calves and attack the cows at certain periods when they are least able to defend themselves. This species of wolf does not congregate in large packs like the prairie wolf, but roams solitary.

This evening five Pawnee Indians came into our camp. They were on foot, naked, and had their faces painted. As our party was very small, and we knew from the behavior of these fellows that there were plenty of Indians near us, we changed our position for one more defensible. All our horses were picketed close to the camp; the cabrestoes were shortened; wagons and tents arranged, so as to form a compact ring; the arms examined and the guard doubled; the whole camp was in a state of watchfulness, momentarily expecting an attack. I lay for the greater part of the night by the side of a wagon, with my rifle across the tongue, constantly expecting to see some redskins crawling amongst our horses; but the night was undisturbed, save with the howling of wolves and the bellowing of buffalo.

Saturday, 18*th*.—This morning, as soon as it was light, we saw a large band of buffalo, not more than 300 yards from us, walking slowly to the ponds close by; they were to the west of us, and as the wind did not blow towards them they paid but little regard to our proximity.

Some of the patriarchs of the band were on the lead; they were all moving with slow and measured tread, as if attending a funeral. Now and then some of them would cast a sinister glance towards us, but still continued to move on with the same slow pace. I got my spy-glass in order to examine them with great minuteness, and thence commenced making sketches. Soon there was a general commotion amongst the buffalo; they raised their tails, tossed their heads into the air; now and then the bulls would dash at each other, when suddenly the whole band separated into small dense groups that scampered off to the four winds of heaven. We instinctively grasped our guns, not knowing whether friend or foe might appear, and soon saw a number of horsemen urging their jaded steeds under the pricky spur. At every touch the impatient riders gave, the tails of the wearied horses were thrown into the air, and the slow gait at which they moved showed that they had been riding fast and far. They were pursuing a buffalo of immense size, apparently wounded; the buffalo now turned, but his intended victim shyed, and as the horsemen passed by, we saw the smoke of several shots burst forth; the horsemen now turned, and ere long the buffalo lay extended upon the ground. We saw them all dismount, and in a little while after Captain Karsons rode into our camp. We inquired the position of the main body, which we were anxious to rejoin, for ourselves were suffering from the harrassing night we had passed, and our horses were suffering from our being necessitated to picket them so closely for fear of Indians; and both ourselves and our horses daily suffered from want of water. As we were moving along, a band of buffaloes ran towards us; but as they passed, kept off some distance, running parallel with the road. Our Indian

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friend noticed them, and as they passed, dismounted, stooped down, and drew up his rifle; as the smoke burst forth from the muzzle of his piece, we saw a fine buffalo cow lash her heels high in the air, and then continued to jump and kick for a quarter of a mile or more, when she fell and all the rest of the herd gathered around her. We already had the meat of two fat cows, and as the wagons were so far from the place where the cow had fallen, she was left to feed the wolves.

The ruts of the road were full of little lizards, sunning themselves; as we approached they would dart briskly away, manifestly disinclined to play the part of devotees to Juggernaut.

In crossing to the river we found the ground in many places covered with beautiful gallardias (g. amblyodon) and the eupatorium, while in the moist grounds we saw the curious dodder twining in its golden tendrils all the plants that grew around it, forming an inextricable entanglement.

Among the birds, we saw many of the sky-larks and several avosets (recuroirostra ames.) The tail and its coverts white, wings black and white, legs blue, and bill recurved.

When we first struck the river, we met with Major Clark's battalion of artillery, a fine body of troops, well uniformed and of soldierly bearing.

Having marched a few miles along the river bank, we formed our camp, after travelling this day a distance of 19 miles.

Sunday, July 19th.—Marching along the Arkansas bottom one is struck with the variety of swamp grasses. Here we find the triangular grass, (scirpus triguctio,) and mingled with it in great abundance the scouring rush (equisetum hyemale) and the beautiful liatris (liatris spicata.)

After we had started, I went back three miles to meet Gen. Kearny in order to get some one to go with us and show us the exact location of the capture of the party of Texans by Capt. Cooke, 2d dragoons, in 1843. General Kearny detailed Lieutenant Love, who showed us the spot that we sought. On the south side of the river, there is a large grove of cotton wood trees that extends some distance along the river bank, and is the first grove of any size that the travelle west meets after passing Pawnee fork, which, by the route we came, is 64 miles distant.

In the evening we went to General Kearny's camp to get some of the horses shod. We had expected to have gone not more than three or four miles, but only reached them after a ride of eight miles, so deceived were we with regard to the distance by the purity of the atmosphere. As it was quite late, we concluded to remain here until the camp should overtake us in the morning.

Monday, 20th.—This morning we had not marched far when we saw General Kearny's guard stop and encamp. Soon Lieutenant Emory, who had crossed the river, rode over and informed us that General Kearny was very ill, and ordered one of our wagons to remain for the purpose of conveying the general on by easy stages; for our wagon was light and had good springs, while all the other wa-

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gons with the army were without springs and roughly built, like common Santa Fé trade wagons.

This day we made a march of 31½ miles, passing along the top of a barren ridge, between one and two miles from the river. Nothing was to be seen but the curly buffalo grass, now parched by the summer's heat. The sun poured down his rays most lavishly; the men all dismounted and walked, in order to rest and to relieve themselves from the singular sensation produced by the heat. First one and then another of the party became ill, and several were seized with a severe vomiting.

In the evening I went over to Major Clarke's camp, in order to have an axletree made. There I saw many who appeared to be ill; amongst them were Captain Weightman and Lieutenant Dorn.

I returned to our camp and passed a sleepless time, listening to the footsteps of the guard; and, now and then, the conversation of the French boys broke upon the stillness of the night; they, too, were not able to sleep soundly. We were all extremely anxious with regard to General Kearny's health.

Tuesday, July 21*st.*—This morning we presented quite a sorry looking array of human faces. At day-break I was seized with a vomiting, which lasted some time; I was obliged to send for the doctor. I however determined to push forward in compliance with the order of Lieutenant Emory, who was with General Kearny, and committed myself to the wagoner's care, while Lieutenant Peck took command of the camp. Lying here, my eye roved over but a confined prospect; under me were bundles of bedding, with blankets, red, blue and white; near me, a sick man, languidly gazing upward; above me, the bended bows of the wagon that supported a large white cover, through which the sun beat with intense heat; and, in front, through a little hole, one caught sight of the landscape dancing to and fro as the wagon jolted along.

We formed our camp, after a march of 11 miles, at the Santa Fé crossing, and in the vicinity of Major Clarke's battalion of artillery, so that we could have an opportunity of completing our axletree that we began yesterday. We soon saw our wagon, and learned that General Kearny had perfectly recovered.

At this place we obtained some beautiful purple lilies, (eustoma russeliana,) and Mr. Nourse brought me a psoralia, with a monosepalous calyx. On the opposite side of the river there are several Indian bodies, wrapped in blankets and skins, exposed on platforms of lodge poles, high up in cottonwood trees, where they are safe from wolves and the sacrilegious touch of men. The air of the prairie produces rapid desiccation, and, in this respect, resembles that of Egypt and the islands of the ancient Guanches.

From the 21st of July until our arrival at Bent's fort, on the 29th, being all the time sick, I have no recollection of anything that transpired, excepting a drawing that I made of the sand rat, (pseudostoma brissarius.) The body and legs are covered with yellowish brown hair, plumbeous at the base; belly, white; anterior claws, strong and large; posterior claws, short; iris, black; ear, projecting slightly. On each side of the upper jaw are two exterior pouches,

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1 4-5 inches in depth; tail covered with short hair, a little less in length than one half the length of the body; body about 6 inches in length. The pouch is covered with short white hair, and capable of being turned inside out. This, I think, was a young one; hence the slight differences in the size and the color of its legs, and the tail being covered with hair.

Captain Turner, of the 1st dragoons, brought me a (ortygometra carolinus;) these birds are in plenty along the Arkansas bottom; this one was caught after a short chase, for it flew a short distance only, when it appeared to be too much fatigued, or too much bewildered to rise again.

Of the plants that occur between the Arkansas crossing and Bent's fort, I cannot do better than refer to the list appended to this report, in which they are arranged in the family to which they belong, and the locality mentioned in which they were obtained.

As one approaches Bent's fort, he meets with many varieties of artemisia, with the obione canescens, and a plant which is extremely useful to the Mexicans as a substitute for soap, by them called the palmillo, by us Adams needle, or Spanish bayonet; its botanical name is the yucca angustifolia. We also have the prairie gourd, (cucumis perennis;) that is abundant also from Bent's fort to Santa Fé. We have the bartonia, several varieties of solanas, several varieties of œnothera, the martynia, the cleome, the salicornia, ipomea, and erigonums. Amongst the trees, several varieties of populus; amongst which are the populus canadensis and p. monolifera; several varieties of salix, and the plum and cherry.

Amongst the animals, we have the panther, (felis concolor;) the wild cat, (felis rufa;) the white wolf, (canis nubilus;) the prairie wolf, (canis latrans;) the silver-grey fox, (canis cinerea argentus;) and the prairie fox, (canis velox;) prairie dog, (arctomys ludoviciana;) the gopher, (pseudostoma brissarius;) the antelope, (dicranocerus furcifer;) the grey bear, (ursus ferox;) also a species of vespertitia and species of ground-squirrel; it is said that there are three different varieties. Along the Arkansas, where there is sufficient cover, one finds the red deer, (cevus virgin.,) one also finds the badger, (taxus labradoricus;) and the polecat, (mephitis Amer.) The Indians at the fort showed me a racoon (procyon lotor) skin, they said had been obtained in the neighborhood.

Amongst the birds, the turkey vulture, (cathartes atra;) wild turkey, (meleagris gallipavo;) quail, (ortix virgina;) red-headed woodpecker, (picus erythrocephalus;) meadow lark, (sturnella ludoviciana;) night hawk, (chorodeiles virgins;) cow-birds, (molothrus pecoris;) dove, (ectopistes carolin;) flickers, (picus auratus;) raven, (corvus corone;) and the railtailed buzzard, (batco borealis.) There has also been found on the Arkansas, within eight miles of Bent's fort, a singular and but little known bird, called the pasana, (geococyx viaticus.)

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RANUNCULACEÆ.

Clematis Virginiana. Raton pass and the mountain passes near Santa Fé.

Delphinium azureum. Raton pass.

Podophyllum peltatum. Woods near Kanzas river, and at Council grove.

Ranunculus acris. Near the Wakaroosa buttes.

Thalicterum cornuté. Near Pawnee fork.

Anemone Pennsylvaniana. Between "El Rio Cañadian" and "El Rio Moro."

Ranunculus aquatalis. Found in the "Raton creek" and head waters of the Purgatory creek.

MENISPERMACEÆ.

Menispermum Canadense. Near "Big John spring."

PAPAVERACEÆ.

Argemone Mexicana. First seen at "Pawnee fork," thence on to the Moro.

Sanguinaria Canads. Woods near the Missouri and Kaw rivers.

CAPPARIDACEÆ.

Polenisia graveolens. Near "Bent's Fort," and in the valley of the Timpas.

Cleone intequifolia. At "Big Sandy creek," "Bent's Fort," and Cañadian.

VIOLACEÆ.

Viola cucullata. Banks of "Pawnee fork."

CARYOPHYLLACEÆ.

Lyclinis. Woods of Council grove.

HYPERICEÆ.

Hypericum ellipticum. August 11.

PORTULACEÆ.

Portulacca oleracea. By the road side from "Pawnee fork" to the crossing of the Arkansas.

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LINACEÆ.

Linum regidum. From "Pawnee fork" to "Arkansas crossing."

GERANICEÆ.

Geranium Frémontia. Occurs throughout the "Raton pass."

OXALIDACEÆ.

Oxalis violacea. Near Council grove.
———stricta. From Kaw river to Council grove.

ANACARDIACEÆ.

Rhus glabrum. Bank "Kaw river" and Wakaroosa river.
radicans. Woods at "Big John spring."
near R. aromatica. August 13.

MALVACEÆ.

Sphæralcae stellata, *Torr. and Gr.* "Raton pass" and "Rio Cañadian."
Sida coccinea. Arkansas river and El Rio Cañadian.
Malva pedata. Cottonwood fork and bottoms of Arkansas river.
Sida, (new species.) August 17.

VITACEÆ.

Vitis æstivalis. Along the Arkansas river and Purgatory creek.
riparia. Stranger creek.
vulpina. 110 Mile creek.

RHAMNACEÆ.

Ceanothus ovalis, *var. intermedia*, (*Torr. and Gr.*) Kaw river and Council Grove.
Americanus. Fort Leavenworth.

ACERACEÆ.

Acer negundo. Banks of Pawnee fork.

LEGUMINOSEÆ.

Astragalus. Bent's fort and Ocaté creek.
Glycyrrhiza glabra. Arkansas river.
Gymnocladus Canads. Kaw river.
Petalostemum, (new species.) At "Ojo Vernal."
Psoralea esculenta. "110 Mile creek" and along the Arkansas river.

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Robinia pseudo acacia. Purgatory creek, near the Raton pass.
Baptisia lencantha. As far as Pawnee fork.
Cassia chamæcrista. First seen July 3, thence to the Arkansas crossing.
Petalostemum candidum. High prairies, as far as Bent's Fort.
violaceum. With the preceding.
Psoralea floribunda. Pawnee fork.
Dalea laxifolia. With the preceding.
Lathyrus linearis. August 9.
Amorpha canescens. Fort Leavenworth to Pawnee fork.
Schrankia uncinata. Stranger creek to Arkansas crossing.
Darlingtonia brachy-loba. Pawnee fork and 110 Mile creek.
Glycyrrhiza lepidota. August 13.
Cereis Canads. Kanzas river.

ROSACEÆ.

Cerasus Virginiana. Kanzas river, Arkansas river, and Purgatory creek.
Fragaria Virginiana. Kaw river.
Rubus occidentalis. Missouri river and Kaw river.
villosus. With the preceding.
Prunus Amer. Pawnee fork, Arkansas river, and Cañadian river.
Cralœgus coccineus. Stranger creek.
Rosa lucida. Kaw river.

ONAGRACEÆ.

Œnothera. Several species occur from Kaw river to Bent's Fort.
Gaura coccinea. August 13.

LOASEÆ.

Mentzelia nuda. Bent's Fort and valley of the Timpas.

GROSSULARIACEÆ.

Ribes accreum. Purgatory creek and Timpas, near its head.
triflorum. Diamond spring.

CACTACEÆ.

Opuntia Missouriana. Pawnee fork, Purgatory creek, and Cañadian river.
Mammillaria sulcata. Near Pawnee fork.

CORNACEÆ.

Cornus paniculata. Big John spring.
stolonifera. Stranger creek.
Florida. Kaw river.

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CAPRIFOLIÆ.

Symphoncarpus glomeratis. Purgatory creek.
occidentalis. With the preceding.
Symphora racemosa. Big John spring.

UMBELLIFERÆ.

Sium latifolium. Diamond spring.
Angelica. Head water, Purgatory creek.
Eryngium aquaticum. Near Wakaroosa creek.

RUBIACEÆ.

Galium tinctorum. Ponds near Lost spring.
Cephalanthus occidentalis. Stranger creek.

COMPOSITÆ.

Senecio (near) palustris. Raton.
filifolius. Bent's fort to Santa Fé.
Rudbeckia. Fort Leavenworth to Arkansas crossing.
hirta. Lost spring to Jackson's grove.
Erigeron strigonium. Pawnee fork.
Eupatorium purpureum. Turkey creek, Arkansas crossing, and Bent's fort.
Eurotia lañata. Rio Cañadian to Santa Fé and south.
Frémontia vermiculs. Valley of the Timpas.
Grindelia squarrosa. Arkansas river, near the crossing.
Solidago altissima. Bent's fort.
Solidago. Cotton-wood fork.
Liatris spicata. Crossing of the Arkansas river.
squarrosa. Plum buttes.
Silphium lacenatum. From Fort Leavenworth to Cottonwood.
Coreopsis tinctorea. Turkey creek to Bent's fort.
Asters. With the preceding.
Gaillardia amblyodon. Plum buttes, and on the Moro.
With the preceding. (Leaves lanceolate.)
piumatifida.
Helianthus. Abundant from Coro creek to Santa Fé.
dentatus. At San Miguel.

ERICACEÆ.

Arctostaphylos uranasi. Council grove.

LOBELIACEÆ.

Lobelia leptostacliza. Cottonwood fork.
çardinalis. Bent's fort.

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CAMPANULACEÆ.

Campanula rotundifolia. Raton pass.

OLEACEÆ.

Fraxinus Americanus. Ash creek.

APOCYNACEÆ.

Apocinum androsacmifolium. Lost spring.

ASCLEPIADACEÆ.

Asclepias verticillata. Stranger creek and Pawnee fork.
tuberosa. Fort Leavenworth to Cottonwood fork.

CONVOLVULACEÆ.

Ipomea leptophylla. Walnut creek to the Canadian river.
Cuscuta Americana. In the bottoms near the "caches."
Convolvulus. (Near sepium.) August 14.
Euploca convolvulaceæ. Raton pass.

BORAGINACEÆ.

Myosotis glomerata. Arkansas river, near caches.

POLEMONIACEÆ.

Gilia (cautua) longiflora. Raton pass.

LABIATÆ.

Hedeoma leptophylla. Near crossing of Arkansas
Monarda fistulosa. Near caches.
allophylla. 110 creek; Cottonwood fork.
Mentha peperita. Bent's fort.
Salvia azurea. Arkansas bottoms and New Mexico.
Teucrium Virginicum. Pawnee fork.

SOLANACEÆ.

Solanum nigrum. Bent's fort.
triflorum. Arkansas river, near crossing.
Nycterum lobatum. From the caches to Bent's fort.
Physalis. August 4.
lobatum. Near Bent's fort.

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SCROPHULARIACEÆ.

Pedicularis canads. Near Pawnee fork.

CHENOPODIACEÆ.

Chenopodium album. From Fort Leavenworth to crossing.
Frémontia vermicularis. Purgatory creek and Timpas.
Artemisia. Purgatory creek.
Obione canescens. Valley of the Timpas.
Salicornia herbacea. Arkansas river crossing.

VERBENACEÆ.

Verbena pinnatifida. Rio Canadian and Rio Rayado.
angustifolia. Little Arkansas river.
Lippia cuneifolia. From Pawnee fork to Santa Fé.

CUCURBITACEÆ.

Cucumis perennis. From Walnut creek to Santa Fé.

NICTAGINEÆ.

Oxybaphus, (new to me.) *Torr.* Slender branching spears. "Rio los Animas."
nictaginea. Raton and "Rio Canadian."

POLYGONACEÆ.

Erigonum. Walnut creek.
tomentosum. Council grove.
Polygonum, (long lacerated sheath, no flowers.) Walnut creek.
amphibium. Turkey creek.

LAURACEÆ.

Laurus benzoin. Kaw river and Council grove.

EUPHORBIACEÆ.

Euphorbia marginata. Pawnee fork to Bent's fort.
hypericifolia. Turkey creek.
? By the road side, near the "caches," and in the buffalo wallows.
Croton capitatum. Crossing of the Arkansas river.

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URTICACEÆ.

Humulus lupulus. Raton pass and Canadian river.
Morus rubra. Council grove and Kaw river.
Urtica canadensis. Kaw river and Stranger creek.

ULMACEÆ.

Ulmus Americana. Pawnee fork.
Celtis crassifolia. Woods at Council grove.

AMENTACEÆ.

Salix longifolia. Council grove, 110 Mile creek.
(no flowers or fruit.) Arkansas river.
Populus monolifera. Timpas, at head of Purgatory creek.
canadensis. From Kaw river to Santa Fé.
(new to me.) *Torr.* Rio Canadian.
Salix augustifolia. Arkansas river.

CONIFERÆ.

Juniperus Virginica. Timpas, and from Purgatory creek to Santa Fé.
(different from Virginica.) *Torrey.* Near Santa Fé.
Pinus monophyllus. Raton pass to Santa Fé.
rigida. As above.

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MONOCOTYLEDONOUS OR ENDOGENOUS PLANTS.

ALISMACEÆ.

Sagittaria sagittifolia. Head of Timpas.

MELANTHACEÆ.

Melanthuim Virginicum. Stranger creek and Wakaroosa river.

LILACEÆ.

Yucca angustifolia. From Bent's fort to "Fra Cristobal."
Lilium tigrinum. Wakaroosa river.
Enstoma Ruseliana. Bottom of Arkansas and Cañadian.
Alluim vienale? Raton pass.

JUNEACEÆ.

Juncus tenuis. Raton pass.

COMMELINACEÆ.

Tradescantia Virginica. Fort Leavenworth to "110 Mile creek."
rosea. With the preceding.
Commelina angustifolia. Pawnee rock and Raton pass.
(long accuminated spatha.) Raton.

SMILACEÆ.

Smilax rotundifolia. Kaw river, Council grove, and 110 Mile creek.

CYPERACEÆ.

Scispus triqueter. Low grounds near Arkansas crossing.
atrovirens. Pawnee fork.
Cyperus filiculmis. Little Arkansas.
Carex festuca. Wakaroosa river.

GRAMINEÆ.

Arundo phragmites. Arkansas, Timpas, and Cañadian rivers.
Sesleria dactyloides. Pawnee fort to Bent's fort.

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Agropyrum. Stranger creek.
Atheropogon olygostachium. Canadian river.
Koeleria nitida. Pawnee fork.

EQUISETACEÆ.

Equisetum hyemale. Near crossing of the Arkansas.

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APPENDIX No. 7.

Washington, *December* 6, 1847.

Sir: I have the honor, at your request, to address you a brief memoir on the subject of the district of country in Sonora, Mexico, which I passed over in November and December last, with a wagon train, when I deviated, in search of a practicable route, from the mule trail of Brigadier General S. W. Kearny, on his march from New Mexico to California.

When he turned off from the Rio Grande, opposite the copper mines and the heads of the Gila river, I kept the river for thirty miles to the south, and making a southern bend, turned again towards the north, and struck his route (as surveyed by Mr. Emory of your corps) just above the village of the Pimo and Maracopa Indians, an estimated distance of 444 miles.

Immediately below the point of deviation, on the Rio Grande, the country bordering the river became sensibly flatter and less broken. I left the river when in view of a point marked on the common maps as "San Diego," and the distant view towards "El Paso" proved the country to be unbroken and comparatively level.

From the high valley of the river I ascended to the *table land* of Mexico, by an almost insensible slope over *smooth* prairie. For 150 miles on this smooth level table land, which is studded with isolated hills or mountains, I journeyed without any difficulty, passing over but three hills, in two cases, I know, in the third, I believe, unnecessarily. I then, unexpectedly and suddenly, arrived at a great break off to a lower level of country, the descent to which was very broken and rough mountains for fifteen miles. I found, however, that I had at that moment fallen into an old wagon trail, which led, I was told, from Yanos. I was able to get my wagons through, following a stream all the way, and descending in the 15 miles possibly a thousand feet. This was the head of the Huaqui river, which empties into the California gulf. I was told that this was called the Pass of Guadaloupe.

I then passed an unbroken country, about 80 miles, when I fell upon the José Pedro river, which empties into the Gila. I descended this without difficulty of ground about 80 miles. In turning off there is an ascent to nearly level country of, perhaps, above an hundred feet, but it could be made very gradual. It is then about 48 miles to Tueson, a town of about 500 inhabitants with a fort and garrison. This distance is over much smooth ground, maintaining the same general level. Tueson is in a rich and well cultivated valley, where there is also a dense forest of *maguey*. From Tueson it is some 75 miles to the Gila. It is a level plain, generally of clay, where my wagons and footmen (water being very scarce) passed at the rate of about 30 miles a day.

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On the map which I made, and which is in your bureau, is marked a route considerably to the north of Guadaloupe pass, which, some of my guides believed, would avoid that broken descent, and be fouud to be nearly level throughout to San Pedro, at the point where I turned off from that beautiful little river. The most sensible and experienced of these men, Laroux, who lives in Taos, New Mexico, and who had trapped on the Gila and passed in a different direction over that country, was decidedly of this opinion, but his knowledge, on the other hand, was sufficient to forbid to explore it, in my situation, on account of scarcity of water.

The Rio Grande bottoms for a hundred miles above, and at the point where I left, are well timbered; there is no timber on the table land, save upon the small mountains which are everywhere to be seen; this is cedar and pine, but of small growth. Rock is everywhere to be had, secondary rocks of almost every kind; but by this wonderfully level route, the continent may be passed with scarcely a view of granite. As far as Tueson the gramma grass is abundant; it will fatten cattle while working, and in winter. The route from Tueson passes through a country abounding in exceed ingly rich gold mines.

I am, very respectfully, sir, your obedient servant,

P. ST. GEO. COOKE,
Major 2d Dragoons.

To Col. J. J. Abert,
Topographical Engineers.

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REPORT OF LIEUT. J. W. ABERT,

OF HIS

EXAMINATION OF NEW MEXICO,

IN THE YEARS 1846–'47.

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UNIV. OF MICH.

SANTA FE

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REPORT.

To Colonel J. J. Abert,
Chief of the corps of topographical engineers:

We left Fort Leavenworth on the 27th June, 1846, under the command of General Kearny; as the events of the march of the army were recorded by Major Emory, I shall not touch upon them. On the 22d of July I was taken ill, to such a degree that it was necessary to carry me in a wagon from that time until the 30th of July, on which day we arrived at Bent's fort. At this time my disease had obtained such an influence over my senses, that days and nights were passed in delirium, and a mental struggle to ascertain whether the impressions my mind received were true or false. Even my sight was affected, and when I gazed on Bent's fort, the buildings seemed completely metamorphosed; new towers had been erected, the walls heightened, and, as I then thought, everything put in readiness to resist an attack of the New Mexicans. The army under General Kearny marched on to Santa Fé, while I was left, harrassed with the thoughts of having come thus far, and having been stopped just as I was entering upon a field full of interest to the soldier, the archeologist, the historian, and the naturalist.

On the 26th of August, I had recovered sufficiently to resume my diary; this, with a copy of Horace, a Greek testament, and my sketch book, served to make the hours of confinement pass pleasantly.

It was on the 26th of August that we first heard of the capitulation of Santa Fé; General Kearny had entered the city without meeting any opposition, except pompous threats from his excellency Don Manuel Armijo. Mexican officers met our army at "El Rio Moro," others at "Las Vegas," but our bold soldiers heeded not the messages or letters which they brought, and our general is said to have replied in these words: "Tell your commander that I shall meet him in Santa Fé on the 18th day of August; if he wishes to be friendly, I am ready to meet him as his friend; if he wishes otherwise, I am ready to meet him as his foe."

The cool determination of our brave army seemed to have completely overawed the enemy; he first yielded his position at the "cañon," near "Vegas," and fell back to a more formidable pass, which lies fifteen miles east of Santa Fé. At this place the road

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leads alongside of a torrent shut in closely by rugged rocks that beetle overhead; such a pass that a few bold men could there hold an army at defiance.

Armijo, knowing the advantages of this place, threw up breastworks on the crest of cliffs on both sides of the cañon, filled them with armed men, who also collected piles of huge fragments of rock to hurl down upon the heads of us heretics. He also stationed some pieces of artillery, so as to have a sweeping fire along the road, enclosing them by an "abattis" constructed of the trunks of the cedar, and often whole trees, with the ends of the limbs sharpened and pointed outward, offering an impenetrable barrier to a cavalry charge. As our army approached Armijo retreated, "huyeron cobardmente los que juraron morir ó vencer," and General Kearny entered Santa Fé on the 18th day of August.

This joyful news made me the more anxious to hurry on to Santa Fé; but my recovery was extremely slow, as my sickness had been so prolonged. Seeing that I took an interest in the natural history of the country, the gentlemen of the fort would daily visit my room, bringing rare plants and minerals; and I also succeeded in enlisting the services of several Cheyenne Indians, who were lounging about the trading post. On the 26th August, a commissary train of 42 wagons arrived. The teamsters refused to go beyond this place, as their articles of agreement did not require them to go further. During the day, Mr. Nourse, of Washington, who had remained with me ever since I had been sick, kindly procured me some ornithological specimens; among these were the killdeer plover, charadrius vociferous, the dove, ectopistes carolinensis. The men in their leisure moments amused themselves with fishing. Cat fish and hickory shad are the only kinds I have ever seen in these waters; and we found them very palatable, although they may not be compared with the white fish of Lake Superior or the rock fish of the Potomac. To-day, Captain Walker, so famous for his adventures in California, paid us a visit. He has a party encamped on the banks of the river about 8 miles north of the fort, and is there awaiting the arrival of Colonel Price's regiment, for which he has a supply of mules. As the antelope and deer were quite abundant in the vicinity of his camp, Mr. Marcellus St. Vrain went off with him, intending to spend a week in hunting, and obtain relief from the close confinement of the fort.

Thursday, August 27.—Anxious to arrange all my preparations in good time, I set about purchasing mules, and bought some very good looking ones, but they were not yet broken to the draught. I had them harnessed, and got Pilka, an old voyageur, to drive them. He was one of those hardy men who had become inured to all kinds of difficulty in the service of the American Fur Company, and, having often been placed by necessity in emergencies which called forth all the resources of his ingenuity, had acquired a facility of doing well everything that he undertook. Such men know the necessity of discipline; are ever ready in time of danger,

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and never allow their courage to be damped, or their cheerfulness clouded by the difficulties with which they may be surrounded.

Although he had never driven before, yet he at once threw himself into the saddle of the wheel mule and took the reins. Twice the mules ran off with the wagon, and, notwithstanding Pilka was obliged to throw himself out of the saddle, he at length succeeded in subduing them. I had now recovered my health sufficiently to walk down a flight of steps unaided, and I rejoiced with great joy to find myself gaining strength so rapidly.

Mr. Holt presented me with a beautiful skin of a wild cat, (Felis rufa,) such as is found in the neighborhood. He informed me that the wild cat frequently attacks the oxen, springing upon their backs or chest, and wounding them terribly with its sharp claws. The wounds thus produced are extremely poisonous. Great inflamation and swelling of the injured parts ensue, and often the oxen die, although the wounds may be but skin deep. On the other hand, the wounds made by the wolves heal rapidly, although the ox may have its hams so much torn to pieces that one would think its recovery impossible. Whenever any one of the cattle raised at this place has wandered off, and is attacked by either of the above mentioned beasts of prey, it bellows loudly for help, and the rest of the herd always rush to the rescue. In the winter season the wolves become extremely bold, and will attack any animal they may meet alone upon the prairies, with the exception of man.

On the 28th of August we had an arrival of from 40 to 50 commissary wagons. The teamsters crowded into the "patio," and from thence commenced a minute scrutiny of every object around them, greatly to our annoyance, and unfavorable to their character for politeness. To-day "Nah-co-mense," or "Old Bark," a chief of the Cheyennes, and one of my last year's friends, entered my room. He appeared delighted to meet with me again, and sorry to see me looking so emaciated. After regarding me for a short time in silence, he placed his hand upon his heart and fluttered his fingers rapidly to intimate that my pulse had been beating with the high excitement of fever. As I was glad to meet with him, I treated him to some hard bread and to some molasses and water.

During the morning Captain Walker sent me some fine venison, but what delighted me exceedingly was the promise I received from the hunter who brought it, that he would procure me skins of the three different varieties of ground squirrels that are to be had in this part of the country; also that of the prairie dog; for although the last mentioned animal is well known, yet the skins are rarely to be met with in cabinets of Zoology. When shot with the rifle, the skin is too badly injured to be preserved.

There were some men encamped near the fort who procured 5 or 6 prairie dogs by pouring water into their burrows until the animals were driven out. They soon became perfectly tame, and were carried into the settlement by their owners a few days before I heard of the circumstance.

August 29.—Doctor Hempstead, one of the residents here, made made me a present of a number of minerals which he had collected.

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He also brought me some specimens of the Myrtinia Proboscidia, and cleome integrifolia. The pods of the first mentioned plant are often used for pickles, and the latter plant is one of the most beautiful that meets the eye of the prairie traveller, covered as it is with rich clusters of pink flowers.

To day a number of Cheyennes visited the fort, amongst them were Old Bark, his son "Ah-mah-nah-co," and Yellow Wolf, "O-cum-who-wast." The latter is a man of considerable influence, of enlarged views, and gifted with more foresight than any other man in his tribe. He frequently talks of the diminishing numbers of his people, and the decrease of the once abundant buffalo. He says that in a few years they will become extinct; and unless the Indians wish to pass away also, they will have to adopt the habits of the white people, using such measures to produce subsistence as will render them independent of the precarious reliance afforded by the game.

He has proposed to the interpreter at Bent's fort, to give him a number of mules, in the proportion of one from every man in the tribe, if he would build them a structure similar to Bent's fort, and instruct them to cultivate the ground, and to raise cattle. He says that for some time his people would not be content to relinquish the delights of the chase, and then the old men and squaws might remain at home cultivating the grounds, and be safely secured in their fort from the depredations of hostile tribes.

The Cheyennes are among the few tribes for whom the United States has not done anything, and they are among the most deserving of assistance. Of late they appear to be getting discontented with such treatment; they say, "we have not robbed or stolen from you, and you take no notice of us, nor do you make us any presents, while you are continually doing benefits to the Pawnees, who both kill and rob your people, and who are our enemies."

They have the reputation of conducting themselves well, of trading liberally, and of committing fewer depredations upon the whites than any other nation. Seventeen years ago they numbered 400 lodges, but they are now reduced to one half that number. Last year they suffered great ravages from the measles and the hooping cough, and what was to them a still greater calamity, they were suffering from hunger, not having seen any buffalo, except now and then a single bull. This year they did not see any droves, from January, when they were hunting in company with Mr. William Bent, at the crossing of the Arkansas, until the early part of this month. As the people of the United States have been, and are, the great cause of the diminution in the quantity of game, by continually travelling through the country, by multiplying roads, and thus destroying the quiet ranges where the animals breed; by killing many of them, and by the immense numbers that they induce the Indians to destroy for their robes, it seems but fair that the United States should assist these Cheyennes. At this moment a very beneficial influence might be exerted upon them, as they have their minds now full of this plan of O-cum-who-wast's, of forming per-

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O-CUM-WHO-WAST.

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manent habitations, and of living like the whites, by tilling the ground and raising cattle.

The next morning, Sunday, August 30, was a day of rest. The constant repairing of the wagons that were daily coming in from Fort Leavenworth, kept the people here very busy. The ring of the blacksmith's hammer, and the noise from the wagoner's shop were incessant, so we all hailed the day with gladness; those who labored, as a day of repose, those who did not labor, as a day of quiet.

During the day Ah-mah-nah-co paid me a visit, bringing a present of a pair of moccasins, ornamented with porcupine quills, worked into a figure resembling a squaw; this ornament seems peculiar to the Cheyennes. "Nah-moust," or "Big left hand," also came to see me; he is one of the largest Indians of the tribe, measuring 6 feet 2½ inches in height, and is very stout and broad shouldered. He has grown so large that he has been obliged to give up hunting, of which he was fond in his more youthful days, for few Indian horses could sustain his weight through a buffalo chase. He is extremly ingenious, and handles his knife with great skill, and is considered the best arrow-maker in the village. The young men, when going to hunt or to war, call on the skillful "Nah-moust" to obtain their arrows, and his lodge receives, when they return successful, a fair partition of the fruits of the chase, or the spoils of the Indian foray.

August 31.—While walking around and endeavoring to recruit my strength by exercise, I was struck with the countenance of a strange Indian. Upon inquiry I learned that he was called "Mi-ah-tose," and the whites had given him the sobriquet of "slim-face." Not long ago he made a visit to St. Louis, Missouri. It is curious to hear with what close scrutiny he regarded every thing that chanced to meet his eye. Being a man of great influence, and the often chosen partizan of war parties, his companions do not fail to give credit to his narrations, which to them are truly marvellous. The weight of his character, or more probably the fear of his anger, as he is a great warrior, forbids their daring to utter a doubt.

He seems to have been best pleased with the riding and the horses that he saw one evening at a circus. He recollects perfectly every horse that appeared, and gives an account of the colors, marks, and trappings of each one of them, with extraordinary exactness and minuteness of detail. To see the whites ride so well, was to him almost incomprehensible, and was the only superiority that he would admit that the civilized man had derived from his civilization, when compared with his own rude manners of life. He wondered much, too, to see so many people living in one town, so far from any hunting grounds. Wishing one day to ascertain exactly the number of inhabitants, he procured a long square stick, and set himself down on the pavement to note the passers by, cutting a notch in his stick for each one; in a little while his stick had no place left for another notch, and he commenced counting, and counted, and counted, but as the busy stream of the multitude flowed on undiminished, the Indian was obliged to give up his in-

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tention, and now threw away the stick that he had at first resolved to take home and show to his people.

Our Indian friends intended leaving here yesterday, but as they get well fed, and have nothing to pay, they are not over anxious to go away.

In the evening I was carried down to the river, and took a bath in the refreshing waters of the Arkansas. Between the fort and the river there is a low piece of ground that was once cultivated, the traces of the "Acequia," by which it was irrigated, are yet visible, but the Indian destroyed everything before the owners could reap the fruits of their labor; hence, although the soil gave great promise of being productive, it has ever since been neglected. This bottom land was now chequered with brilliant masses of color, produced by the groups of plants which were growing in great luxuriance. The golden rod, (S. altissima,) the purp. Eupatorium, (E. purpurea,) the sunflower, silver marged euphorbia, (E. marginata,) and the pink cleome, mingled together, clad in their brightest hues; and the sandy plain that skirted the bottom was varied with the golden gourd, cucumis perenius, and a beautiful species of solanœ.

I measured to-day the skin of a panther, felis coucolor, that was 6½ feet in length from the end of the nose to the root of the tail. It had been killed on the Cañadian by the Kioways. I also examined some skins of the grey and white wolves; and, from all I can learn, these animals are one and the same kind, as the grey wolf becomes whiter as it advances in age. Some of the skins were white, some grey, and others in a transition state.

September 1.—I obtained several singular plants, and amongst them a beautiful species of the lobelia; and I had scarce finished, my drawings of them, when "Nah-moust" and "Ah-mah-nah-co" knocked at the door of my room. I showed them my port-folio, and got them to give the names of the plants, insects, and animals that they knew. After making a complete inspection of my port-folio, I induced "Ah-mah-nah-co" to sit for me; he willingly complied, and, choosing his attitude, sat perfectly motionless until I had both drawn and painted my sketch. I then showed it to him, whereupon he seemed much pleased, and after regarding it for some time, he desired me to write his name underneath; I commenced and he gave me two names, first, "Nah-moust," and then "Ah-mah-nah-co," which means the bear above. The surname had been bestowed in accordance with an Indian custom, similar to that of the knights of ancient chivalry, who always received a surname after they had done some valiant deed.

Our Indian friends have become completely domiciled here, where they are fed and have every thing they need furnished to them; for if their wishes were not gratified, they would not bring their furs to this place to trade. As food is scarce, the people of the fort are obliged to give them something to eat, and the Indians never fail to be present at meal times.

An old man called "Isse-wo-ne-mox-ist," supplied his family with fish that he caught in a species of dam or trap that he had

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OLD BARK'S SON AH-MAH-NAH-CO AND SQUAW.

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formed in the river; but some whites passing by had destroyed his trap, and to-day he has been complaining bitterly about their conduct. He is the same man whose portrait I took last year, and is conspicuous on account of his wearing his hair twisted in the form of a large horn, that projects from the centre of his forehead.

Yesterday I met with Captain Walker again; in my conversation he mentioned that the box-elder, "acer negundo," furnishes a sap which is highly saccharine, and when the hunters are in want of sugar, they collect some of the sap of this tree, and by boiling it form a very good molasses, which answers as an excellent substitute.

September 2.—I had been for some time past endeavoring to obtain specimens of the materials that the Indians use to produce those brilliant hues they give to the porcupine quills, with which they garnish their ornamental trappings.

This morning "Old Bark" brought me what I wished, the sumach berries, with which that bright red is produced, and the moss from the pine tree, that yields a yellow tint. The green dye is made from copperas. What looks like black porcupine quills, are either portions of the quills of birds, or the radicles of the "typhis latifolia," which they flatten by pressing between weights. Old Bark had a piece of pitch in his hands; I asked him what he intended to do with it; he answered me that some of his horses had tender hoofs, and that he intended to press the pitch into the sole of the foot, when, after passing a hot stone over the pitch, it would remain and protect the hoof. During the day, one of the Indians brought me a specimen of the "astragalus" and told me that it was so poisonous as to kill any animal that might eat of it. Thinking it would be a good opportunity to learn the uses of the plants I had collected, and medical properties with which the experience of the Indians invested them, I therefore produced my specimens, and with the assistance of Mr. Smith, who trades for the fort, and who speaks the Cheynne language better, perhaps, than any other white person in the country, I made notes of every thing that my red friends communicated. "Nah-moust," of whom I have already spoken, possesses a secret antidote for the poison of the "she-she-note" or rattlesnake, and my friends here all state that he frequently brings one of these snakes into the fort in his arms. Whilst he is handling it, he is incessantly chewing the root of some plant, and spitting the juice about in all directions, and the snake appears to cower with fear. He is also said to cure any one who may be bitten, by chewing the root and spitting the juice upon the wound. Some of the whites who were present seemed to think that he inadvertently let slip his secret, on seeing one of my plants; this plant proves to be a coreopsis. At Bent's fort, the usual remedy is achohol. They say that if they can make a person drunk, soon after the bite, he is safe.

This evening I again had my sitter of yesterday "Ah-ma-nah-co," seated upon the billiard table. I made a profile sketch, which showed off all his ornaments to the greatest advantage. When I had finished he seemed more delighted than ever; and he pointed

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out his armlets of brass, and bracelets of brass, and the broad masses of beads that garnished his leggins and his tomahawk, with its helve studded with brass tacks, and the long queue eked out with braided horse hair. He asked my permission to introduce his wife and children, and one Indian after another added himself to the spectators, so that I soon had a room full.

These Indians, like those of all the tribes I have met with, pride themselves upon the antiquity of their origin. Like the Arcadians of old, who boasted that they were "Προσεληνοι,," born before the moon was created, and, like people of modern days, who trace their origin back until they become mistified. These Indians talk of their having descended from nations that lived long, long ago, and who came a long, long way to the north; endeavoring to give force to the idea, of the length of the time, and of the distance, by placing their hands close together, and then moving them slowly asunder; so slowly that they seem as if they would never complete the gesture.

In the afternoon Mr. McGoffin arrived; he had been 35 days on the road since leaving Independence, Missouri, and has a train of 25 wagons.

September 3.—Added two more plants to my collection—the "Veronia fasiculata," and the "dietria coropifolia." In the evening, Mr. Marcellus St. Vrain arrived from Captain Walker's camp above us. He said that the antelope were abundant, and there were also some deer; but the sand-flies so annoyed the people up there, that, notwithstanding the abundance of the game, they had enjoyed but little pleasure in hunting.

September 4.—This morning I obtained a fine specimen of the Arkansas shad. They are often caught of a large size; this one measured 17 inches in length. About noon, Mr. Nourse brought me some specimens of "selenite;" the people of the fort burn it, and use it to whitewash walls. I also obtained some crystals of quartz. Our Indian friends are yet loitering about the fort, imposing upon the traders the obligation of feeding them, which the latter are under the necessity of doing, or else lose the furs that the Indians may obtain in the fall.

In the evening another volunteer died, and was buried. They were obliged to cover the graves with prickly pear, or rocks, to prevent the wolves from tearing the bodies out of the ground. At some places along the Arkansas, the Indians place their corpses in trees, out of the reach of the wolf, and the whites would do well to adopt the same plan.

The weather is now becoming extremely cold. Last night we had a very severe frost, and this morning the thermometer was as low as 25°.

Saturday, September 5.—As my room was full of Cheyennes, I took the opportunity to obtain some knowledge of the genius and structure of their language. I found the English alphabet sufficient to represent all the sounds they utter, and at once set myself to work to construct a vocabulary of their language. I had the assistance of one of the best interpreters in the country.

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Their language is considered one of the most difficult of any of those spoken by our Indian tribes, but the difficulty is chiefly due to the habit the Indians have of swallowing the last syllable of every word, so that many persons would hardly notice the last syllable, and therefore omit it when attempting to speak the Cheyenne language, and are not understood by the Indians.

They have no articles; their substantives are nearly as numerous as ours. Plurality and unity are generally denoted by prefixing numbers, and sometimes by terminations; as, vo-vote, an egg; vo-vo-tuts, eggs. Their pronouns have only one number, or rather they are of both numbers. Their numerical terms are beautifully arranged, each one of the digits is expressed by a different name, and the tens are expressed by affixing certain terminations to the digits.

The numbers are thus expressed:

Nast,	one.	Nah-to-te-ot e-nah,	thirteen.
Nish,	two.	do	do
Nah,	three.	Ne-so,	twenty.
Knave,	four.	Ne-so-ote-nast,	twenty-one.
None,	five.	do	do
Nah-so-to,	six.	Na-vo,	thirty.
Ne-so-to,	seven.	Ne-vo,	forty.
Nah-no-to,	eight.	No-no,	fifty.
So-to,	nine.	Na-so-to-no,	sixty.
Mah-to-te,	ten.	Ne-so-to-no,	seventy.
Mah-to-te-ote-nast,	eleven.	Na-no-to-no,	eighty.
Mah-to-te-ote-nish,	twelve.	So-to-no,	ninety.

Mah-to-to-no, one hundred.

They express thousands by so many hundreds; as 10, 20, or 30 hundreds for 1,000, 2,000, or 3,000, &c., &c.

Their degrees of comparison of adjectives are expressed by prefixing words significant of augmentation or diminution; the adjective itself remains unchanged. The verbs have all the principal times, but are only used in one number, as the subject or subjects to which the verb belongs render distinction of number sufficiently exact without varying the number of the verb. They have all the other parts of speech belonging to the languages of civilized nations; but their nouns are the only species of words that will bear a comparison in a numerical view. The Cheyenne is far from being deficient in its capability of expressing abstract ideas. Some persons think that it would be incomplete without gesture, because the Indians use gesture constantly. But I have been assured that the language is in itself capable of bodying forth any idea to which one may wish to give utterance.

From this day forth I spent several hours in the daily study of this language, and had succeeded in forming an elementary grammar; but, on my winter journey back to St. Louis, in December and February, these papers were lost. In fact it was with great difficulty I managed to save anything that I had collected. I have, however, been able to form the following vocabulary from letters

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which I wrote to the bureau, and from notes I had made in my sketch book.

shell	menne
rib	leip
cap	a-tuk
clay	a-slick
canoe	rim mone
axe	ke koi ana no
flour	pini ha con
pike	hay yok
spear	ho moan
shield	ho ah
dance	mah tato uts
drum	on ne ah rome
song	mah nis tuts
toad	own hi
turtle	mine
fool	mah sown ne
soldier	no tak
chief	we ho
goose	en ni
truth	ni turn
kettle	my to took
marrow	alm
salt	wo po mah
mouse	o-ke
knife	mo tah ke
road	me oh
path	ha ke me oh
robe	home
quiver	is tis
tree	aust
grass	moist
bush	ha ke aust
(game) ball	on nish tah ke
race	ono she
fire	oist
woods	mah tah
fuel	moist
sword	ho natt
icicle	mah ome
snow	is ta se
gown	oist
awl	a un
beads	o ne a vo kist
blanket	wo pe she o nun
comb	te ha nay
hawk bells	ah qua bone
owl	nis tah
bullets	ve ol mah

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iron	mah kite
hide	vo tan
back	is tato tom
belly	mah toush she
egg	vo vote
vermillion	ve o mi turn
wagon	ous chim
stone	oun mak
duck	sish ke sun
heap	highst
ashes	pah i
coals	ho us
blood	mi i
dew } frost }	is-she-in-eo
leaves	ve po hits
root	o to mo en
brandy	ve oc map pe
flint	moi su kah
steel	ho pass
cough	mah i mits
gun	mi tun o
heart	hi wit
bone	o co nuts
fear	to tato ist
blow	ome
a place	ne num she us
a gourd	mah an
hair	mik
hill	po e us
mountain	o-mi
marriage	o vis tah one
entrails	ve a ou nist
ground squirrel	menny wah kale
elk	mah ah
badger	mah co
bear	nah co
antelope	vo ka
turkey	mah ka in
chicken	co co ya kine
grasshópper	hah coat
butterfly	a wow chim
beetle	ah me kone
tarantula	we noe
tallow	irch ke
looking-glasses	am vo am is tuto
the pomme blanche	mo o tah
thistle	ish co
rattlesnake	she she note
wild gourd	sub sins how
cactus	mah tah

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cherry	mah ne mick
lizzard	how tah wis
gopher	is te mah
sun flower	ho e nus
racoon	mach coon
water snake	ne e kis
small beetle	meush kis
bee	ha nome
centipede	me-shim me
plum	men ne min
asclepias	mah ton I must
buffalo skull	mah to ah mik
prairie snake	sa so nit tan
buffalo bull	o to wah
buffolo cow	mah no
antelope head	vo ka nah mik
fish	co co na no mine
young badger	tehon

Verbs.

poni vone	to shoot
em ho mi	to cover
o tah hoi ist	to ride
ne know vist	to hide
an no tuts	to roast
is se vote	to boil
o ne ine	to undo
ip po ust	to wrap
mo quis tun	to write
a e uts	to break

Nah-moust entered my room during the day and showed me a looking-glass frame that he had been making. With Indian patience, he had been at work on it for two days; a white man could have made it in half an hour.

In the evening, some Mormons came in from near the "Peublo," about eighty miles west of this place; they brought us some green pumpkins and corn; neither the sweet potatoe nor the cabbage has been cultivated. Around the fort we can gather great numbers of the pods of the myrtinia proboscidea.

This afternoon, "Ah-mah-nah-co" brought me two skins filled with wild cherries, one of the skins was from a young racoon, the other from a young badger. As they were stuffed out of all shape, I did not care much to draw them, but he had been so polite and obliging to me that I sketched them in order to gratify him, at which he felt so delighted that he brought his squaw to take my measure for a pair of moccasins.

September 7.—I commenced in earnest preparing for my departure for Santa Fé. I purchased some "par fleche," buffalo skin,

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dressed so as to form a stiff leather resembling saddler's leather, and is used for pack saddles, harness, and so forth.

I purchased some moccasins to-day, they were made of buffalo skin, dressed without the hair, and had the fronts ornamented with a figure worked in beads, intended to imitate a squaw. They have only one seam, that is on the outer side of the foot, the skin being doubled over; the inside line is perfectly straight. These peculiarities mark the Cheyenne moccasin.

I got one pair made of antelope skin that have fringes attached to the heel one foot ten inches long; these cannot be worn conveniently except by horsemen. In muddy weather the Indians braid all their fringes to prevent them from being soiled. They say that these fringes secure their legs from being bitten by the rattlesnake.

In the evening, I procured a specimen of the little plover, and set to work to transfer it to my sketch book, when old "Nah-comense" came in bringing me a couple of buffalo tongues. I asked him why he had not been to see me before; he, in reply, crooked his forefingers slightly, putting them by the side of his head, to signify buffalo, then dropping his hands a little, with the backs up, commenced moving them downwards, as if passing them over a globe; after which, he brought his hands up in front with the fingers carefully kept distinct, to signify many, then joining the tips of his fingers and thumbs, moved them back and forth towards his mouth, to signify eating, and concluded his gestures by stretching the forefingers and thumbs apart, as if to span something; he placed his hand near his stomach, and moved it up along his body until the muscle, connecting the thumb and forefinger, rested in his mouth, to signify that he was full up to the mouth. All of which meant that he had a heap of buffalo meat, and that he had been eating until he was full up to the mouth. The young men had returned laden with the spoils of a successful foray amongst the buffalo. Although the first time since January that they have had abundance, our friends had not forgotten to gorge themselves in accordance with the custom of Indian festivities.

For the last two days, they had been feasting from morning until night, and from night until morning, during which time I have not seen an Indian near the fort.

This evening a party of teamsters arrived; they seemed to be very insubordinate, and refused to go on to Santa Fé, although the troops there must be greatly in want of provisions. They said, "we engaged to go to Bent's fort, and we will go no further." The cattle and wagons belong to the government, and these independent characters had so wofully neglected them, that the oxen greatly needed rest, and the wagons repairs.

Tuesday, September 8.—I spent this morning employed in taking the dimensions of Bent's fort. It required some time to complete all the measurements. The structure is quite complex; they may, however, be useful in giving one an idea of the forts that can be built in that country. The roof and walls of clay cannot be set on fire, and the thickness of the walls renders them impenetrable to

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the fusil balls of the Indians. Wood is too scarce, and of such a kind as is not suited for building, while the "adobes" answer every purpose so well that they were used by Lieutenant Gilmer, of the engineer corps, at Santa Fé, in the construction of Fort Marcy. I was told that the "adobes" could be bought in Mexico for eighteen cents the hundred.

Pilka, with some of the men of the fort, went down to the mouth of the Purgatory, or "Las Animas," to get the mules, preparatory to starting for Santa Fé in the morning. They found them in a fine pasturing ground, looking much improved.

Mr. Bent's people were cutting hay; they find that the wild grass of the bottoms, when well cured, makes excellent hay.

Captain Walker came down the river, having received information of the approach of a large body of volunteers. He had some sixty head of mules, and will, doubtless, dispose of them to the volunteers with great advantage, both to himself and to the troops, as their horses are completely broken down by the march across the desert.

In the morning Bill Garey arrived here. He was the interpreter last year at the council held in August at this place, by a deputation of Delawares and the Cheyenne nation. He is now engaged in trading with the Indians in the vicinity of Peublo, or Hardscrabble.

Before dark Mr. M. St. Vrain told us that he had concluded to go to Santa Fé. We were all delighted when he announced his intention, as he will doubtless be able to procure us some fresh meat on the march, being a good huntsman, and our road leads through a region that abounds with the deer, the antelope, and the turkey. We are in hopes, too, that we shall be just in time for the wild fruits, as the plum, the grape, and the currant abound, and three varieties of the currant are found in great profusion in the mountain passes. We knew the country to be full of game; we pictured to ourselves the streams of pure cold water, over which the plum trees waved their golden drupes, while the vine twined around the cottonwood or graceful locust tree, or clambered up the mountain sides, laden with rich clusters of the purple grape, and the rocks embroidered with the currant bush, laden with its transparent wax-like berries.

Wednesday, September 9.—We now commenced, in good earnest, to prepare for our journey, and the morning was spent in packing up. I had the coffee all prepared, and enough bread baked to last several days, for I wished to have our time unencumbered for the few first days, until my party, consisting of myself, Mr. Nourse, and Pilka, should get our duties a little systematized.

At 3 o'clock we forded the Arkansas, just as several companies of Colonel Price's regiment were forming their camp. As we left, there was a slight shower of rain, and the sky looked threatening, but we were all too glad to get once more in our saddles to be turned back by a shower of rain. Several times we thought of forming camp, in order to prepare for a storm, for the clouds, with black and lowering aspect, were rushing towards us, and extended

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LAS CUMBRES ESPAÑOLAS.

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around the horizon. They, however, divided and passed along the ridges on each side of the river valley; as the glorious light of the setting sun shone between the division it contrasted strongly with the black clouds on our right and left. The day had been warm, now cool gusts of wind came puffing along the valley, bearing the refreshing scent of new fallen rain. Several hawks, whose outlines cut sharp against the dark clouds, were sporting in the air, sometimes with rapid beating wings contending against the wind, and then, ceasing all efforts, suddenly swept along.

Notwithstanding the risk of a drenching, we continued our march to the mouth of the "Rio Timpa," nearly eight miles west of Bent's, when we encamped on the banks of the Arkansas. Before dark several wagons belonging to Lieutenant Simpson, Missouri volunteers, and Mr. St. Vrain, came up with us.

We enjoyed our suppers as if we had that day taken a long journey. The very idea of once more getting on the prairie produced a pleasurable excitement that extended its influence to our dormant appetites, for want of exercise and confinement to the fort had not agreed with any of us.

At night we had a serenade from a full choir of prairie wolves; they collected around our camp in great numbers, and broke forth in sudden bursts of their inimitable music. There are times when the wolf's howl sounds pleasantly, and again there are times when the spirits of desolation seemed to be conjured up by it.

September 10.—This morning I got several species of willow, amongst which was the long leafed willow, (salix angustifolia;) also two varieties of cotton wood, (P. canadensis, and P. monolifera;) the former is often used in winter to feed horses and mules, and they seem to relish it greatly; of the latter they are not fond.

We tried to start early, but two of our mules gave us a long chase before we could catch them. At length we started up the Timpa. On either side, the prairie was covered with a dense growth of artemisia, under which the timid hare sought shelter; ever and anon the agile antelope, in droves of twenty or thirty, would dash across the road and speed away, until getting the wind of us, they would suddenly stop, and, wheeling rapidly, dash off in another direction with renewed velocity. We soon came in sight of "Las Cumbres Españolas," or the Spanish peaks, their twinned summits towering above the clouds that drifted midway up their sides. Our route bore direct for the peaks.

The road was very dusty, and the wind constantly annoyed us, heaving up great clouds of dust and sand, and dashing them into our faces. The country around us was extremely sterile. Its sandy bosom covered with cacti, amongst which were the cereus cespitosa, and cactus opuntia, and here and there, clustered in groups, the bristling bayonet leaves of the yucca angustifolia, and under our feet hundreds of horned frogs (agama cornuta) were crawling about without heeding our proximity.

We marched twenty miles, and encamped about one mile beyond the point at which the army had turned off from the road. The Timpa at this place is three-fourths of a mile from the road, and

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one is obliged to keep a sharp look out for it, as there is only one or two trees scattered along its bottom, and these almost hidden by perpendicular banks, in many places 15 feet high.

I should advise persons to encamp just before reaching the three conical buttes, a sketch of which was made last year; as they point out this camping place they form a very useful land mark.

The waters of the El Rio Timpa are generally very saline, but the late rain had so diluted them that we found them rather pleasant.

My little party reached this place at 4 o'clock, but the ox trains did not arrive until dark; many of the men, who wore moccasins, were complaining most bitterly of the spines of the cactus; their feet were full of them.

As there was no wood fit to burn, we were forced to use the grease brush; so the voyageurs call it on account of its burning with such a brilliant light. It is in truth the obione eanescens. This, with the artemisia tridentata and Fremontia vermicularis, grows in great abundance along the valley of the Timpa.

Growing among the sage I found the "linosyris dracunculoides." It is here from three to four feet in height. We also found the "artemisia cana."

September 11.—This morning we again had a long chase after our mules; they appeared to be as wild as deer, but we at last caught them. Shortly after we had started, we passed the three conical buttes; their tops are covered with pieces of carbonate of lime, beautifully crystalized. The country now became more broken; on the ridges were scattered groves of cedar trees, and the bottom lands clad with the silvery looking foliage of the artemisias. After a march of 19 miles, we camped at a place called the Willows. Here the road crosses the Timpa; the rocks rise on your right hand to the height of 100 feet, their tops covered with cedar trees, and their sides clad with the currant (ribes cereum) and the tall cactus, "cactus undulata."

When we first arrived we had a long search before we could obtain any water. At last found some brackish pools, half hidden by the tall cane grass, (arundo phraguntes,) and bordered with the cat-tail (typha latifolia) and arrow weed, (sagittaria sagittefolia.)

During the night, my tent came very near being burnt up. A man belonging to the ox train entered my camp, and, throwing some fuel upon the fire, went to bed, leaving the fire burning. The grass caught; all were asleep except myself, and it was lucky for me that I had sat up. I heard the roaring of the fire, and, looking out, found the flames within a few feet of my tent. I shouted aloud, and all the men sprang up, caught their blankets as they rose, and with them soon whipt out the fire. The grass was short, or they could not so easily have extinguished the flames. As my health was not yet firm, I had since starting been very careful to tie the door of my tent, to make it as close as possible; and, when I endeavored to rush out, I found myself imprisoned. Had the tent caught, it would have been as much as I could have done to save myself; my note books and sketches that had

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cost me some labor, and that I valued highly, would have been destroyed.

September 12.—When daylight appeared, I again congratulated myself on the escape of last night. The ground for a considerable space around the fire was one black patch, and this extended to within two feet of my tent. We quickly struck our camp and started for "hole in the rock," which is 7 miles from the Willows. As we crossed the Timpa, at the Willows, and were going south, we had that stream on our left hand side. Where we camped the banks were composed of high, rugged sandstone rocks, covered with a dense growth of cedar and pinyon, (pinus monophyllus.) We noticed along the road many sky-larks (alauda alpestris) and meadow larks, (sturnella neglecta,) differing slightly from the common meadow lark in its note, and in its tail feathers, which, in this bird, are nearly equal; also the flicker, (picus auratus.)

While riding along the road, some distance in advance of the wagon, I noticed a number of prairie dogs seated near the entrance of their burrows, some squatted, half concealed in the mouth of their dwelling, and were barking most vehemently on my approach; but there was one that stood straight up upon his hind legs, presenting his white breast and belly to full view. Although I had never fired off my mule, I could not resist this opportunity of procuring a prairie dog. I drew up my gun and fired, with the quickness of thought; my mule turned directly about, and had made several springs in the direction of the wagon before I could check her. I now rode back, but could not identify the spot where the prairie dog had been sitting. After a little time spent in fruitless search, I continued my journey, resolved not to fire off from a mule again.

We had to search about "hole in the rock" for some time before we found water, and this was covered with a thick, green scum, fit only for the magpies and ravens that we started away from it; but, on hunting down the stream, we found some clear water in a very deep hole. On its margin, in the shade of some willows, there were many frogs sitting; now and then one would make a dart and gulph down a passing fly, so quick that we could scarce perceive the frog's motion. We killed a dozen of these frogs and had them cooked for supper.

This afternoon a young German, who accompanied the ox wagons, entered my camp. I had seen him several times at Bent's fort. On his approach, he greeted me with a salutation from Horace, "quid agis, dulcessime rerum." For some time I did not know in what language he had spoken, his pronunciation being so different from that of an American. He brought me a specimen of the horned lizzard (agama cornuta) and a species of centipede.

In the evening, Pilka caught me a gopher. I was obliged to kill it, as it struggled so hard to get away; fighting furiously with its sharp teeth, and cutting the cord with which I had tied it. I preserved the skin, also the skull; but the latter was fractured by the blow I had given, and the two upper incisors broken off.

We could now see the high, rocky peak that marks the entrance

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to the Raton pass. It looks like a huge, rectangular block, whose longest sides are parallel with the horizon, and is situated on a high bluff.

September 13.—We started this morning with the intention of camping at some pools, at the head of an affluent of the "Rio Purgatorio," called "hole in the prairie;" but, on reaching the desired locality, we found not one drop of water; the bottoms of the dry pools were deeply indented with the tracks of oxen, so closely crowded together as to encroach upon each other; showing how eagerly the poor beasts had crowded here. The earth was baked hard; not one sign of moisture to be seen. We had already marched 15 miles, but must now proceed 12 miles further to the Rio Purgatorio, where we were certain of finding an abundance of water and plenty of wood. On the road we met an ox, walking leisurely in the direction of the United States. It had doubtless failed of its strength, on this long stretch, for want of water.

We searched the Purgatory for plums, currants, and grapes. Although we found bushes and vines in abundance, the fruit had all gone. We here saw several flickers, with red lined wings and tails, (picus Mexicanus.) Also the common flicker, and large flocks of the yellow headed black bird, or troopial.

As our animals showed great signs of weariness, I concluded to remain here to-morrow. It was evident that our mules could not support the fatigues of such marches as we made to-day, over a country so destitute of grass, and affording such meagre pasturage; for the grass was parched by the excessive drought that has prevailed this summer. The water at "holes in the prairie," is generally considered unfailing. While hunting for water in the neighborhood of these holes, we found in the bluffs, which were of slaty structure, fragments of large fossil shells, resembling the inoceramus; the fractures showing innumerable fibres perpendicular to the surfaces of the shells. Scattered around on the tops of little mounds, we found beautiful romboidal pieces of semi-transparent carbonate of lime.

From this place on, we noticed the abundance of the artemisias, the obione canescens, and "Frémontia vermicularis," and a beautiful yellow compositaceous plant, "senecio filifolus;" cacti of several species, covered the plains. As we approached the river, we began to feel quite disheartened at the number of hills that seemed to spring up in order to separate us from the wished for goal. Our mouths were parched with long endured thirst; no one had had a drop of water since morning, for we were disappointed at "holes in the prairie." At length, however, we reached a high ridge, and when the top was attained, a splendid scene suddenly burst upon us. On the right, rose the cloud-capped summits of the Spanish peaks; in front, the gates of the Raton pass, from which issued the much wished for "Rio Purgatorio." This stream, turning to the left, held its course onward, parallel with the front of a high rocky escarpment, its valley marked by dark groves of timber. A misty vapor seemed to proceed from both rock and river, increasing in softness, veiling both river and escarpment, and

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itself blended with the sky; the intermediate space filled with variously shaded hills that are covered with yellow, parched grass; the foreground relieved by clustering thickets of silver leafed artemisia; while the whole is united by the road that passes along over swelling hill and sinking dale; so that the eye travels instantly to the farthest extreme, unimpeded by any abruptness. The whole scene was increased in effect by the appearance of an ox that came slowly towards us, whose loneliness perfected the repose of the landscape.

We now began to feel very anxious for news from Santa Fé. Mr. Ward, who had gone to Santa Fé, and who promised to be at the fort some time since, had not arrived, neither had we met any one on the road, and no news had been received, except the rumor that General Kearny had entered Santa Fé. Still, we knew not how he had been received, nor whether the line of communication was not guarded by guerrillas. Mr. St. Vrain spoke of going on as far as the Rio "Enseñada," to gain some information with regard to the state of the country that we would have to pass through. Daily, persons had passed thé fort going to Santa Fé, but none had come back, "nulla vestiga retrorsum."

September 14.—Spent the day on the banks of the Purgatory; not inappropriately named, as one plunges into a perfect Erebus, amongst the rugged rocks of the Raton.

Our people killed five deer, and Mr. St. Vrain killed a very fat antelope; so the camp was a scene of festivity. At night we gathered around our social fires; the voyageurs grew talkative, and told marvellous tales, and we all devoured meat with the voracity of beasts of prey. It is not unusual for two men to eat a fore quarter of venison without the accompaniment of bread, or even of salt.

To-day I again saw the red shafted flickers, and endeavored to get a shot at them, but they were too shy to be approached. I, however, obtained a beautiul male specimen of the troopial, (agelaius zanthocephalus.)

I made a sketch of the Spanish peaks; there were light clouds hanging around them, but although they lent great beauty to the mountains by the ever varying contour of their shadows, that curved about in "mazes intricate, eccentric, intervolved, yet regular, when most irregular they seem," and the rays of light that pierced these clouds were ever changing; thus, the same scene presented an endless variety.

Along the banks of the stream we noticed great quantities of cotton wood, (P. monolifera,) and locust trees, (Robina pseudoacasia;) also the box elder, (acer negundo,) and dense thickets, composed of the plum and the cherry interwoven with grape vines, formed impenetrable thickets, where the deer, the hare, the rabbit, and wild turkey, found a secure shelter.

The plains are covered with a saline efflorescence, and the ground is quite bare in many places, where the animals had been licking the ground, and have trampled down the herbage. We still find the dwellings of the gopher and prairie dog around us; and the

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cacti are so numerous that one is obliged to thread his path amongst them with infinite care.

September 15.—This morning we were surrounded by flocks of golden-headed troopials, who mingled most socially with the common cow bird, and all in great glee were catching grass-hoppers in the vicinity of our "mulada."

Soon after starting, I rode back a short distance to examine a volcanic dike that stretched nearly east and west across the valley on the north side of the stream; having collected as many specimens as I wanted I crossed the Purgatory.

We now saw on every side a beautiful plant covered with dark scarlet flowers, a species of (nyctaginea oxybaphus.) This plant is one of the most beautiful that we had seen.

As we moved up the valley we found the hills composed of rounded pebble stones, and huge pieces of dark purple rock, that from its vesicularity and general character we knew to be volcanic.

After a march of six miles, we encamped by the side of the Purgatory again, and at the fôot of a stupendous mass of rocks, whose flat tops cut into giant steps are thus connected with the lower levels of the ridge. What a field for the geologist; what pleasure would he have with the rocks piled about and strewed around us. I could not but compare the legends these rocks unfold with the doubtful records of history. See with what detail they present everything to us, showing us specimens of birds, of plants, of animals and the like, telling us when and where they existed. See how they go back ages upon ages! behold with astonishment the mighty deeds in which they have been concerned, the grand convulsions they have undergone.

September 16.—When we got ready for our march, we found that the ox teams had started long before us, but we had not proceeded more than three miles through the forests of cedar and piñon, or nut pine, when we encountered the wagons. One of them had upset, and the traders' goods lay strewed along the bottom and sides of a deep ravine. As I did not wish to be detained, as our little party could not be of any service, I requested Mr. St. Vrain to have the second wagon turned a little to one side, so that I might pass. He drew his wagon out of the way, but as soon as the oxen were loosed, the wagon loaded with the immense bulk of fifty-seven hundred weight of goods, rushed backwards down the hill; luckily it turned off the road, when after crushing a few trees in its course, it brought up against a sturdy pine. I was at the time riding round the wagon and just escaped. The foolish driver had chocked the wheels with a piece of decayed wood.

A few miles beyond the scene of this accident we noticed a high bluff bank, where there were evident signs of coal. I rode over and collected some specimens of fine bituminous coal, and on searching for fossils, found two varieties of dicotyledonus plants; of one sort, the large and cordate resembling the leaves of the catalpa, of the other lanceolate, and not unlike the willow leaves; both sorts had the veins arranged in pairs, and edges entire.

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Two miles beyond this pseudo coal formation we noticed a dike of volcanic rock that runs parallel with the stream, is six feet in thickness, and is composed of various colored rock—scoriaceous in appearance. Near this place we found some of the mossy cup oak, (Q. olivœformis.)

Turkeys are very abundant, also the red shafted flickers and steuer's jay.

The beautiful tunnel of dense foliage that we passed through last year, now looks sad indeed; our horses feet do not now splash in the cool water, and the once variegated pebbles are white with dryness. The former beautiful foliage of the willows that met over our heads, now appears yellow, and the leaves hang as if wilted by fire. Here and there some aquatic plants, hid in deep nooks, still retain something of their freshness. In one place we noticed a fine grove of spruce, (abies alba,) and passed several clusters of mossy cup oaks.

September 17.—We got over the rugged acclivities and declivities of the Raton so expeditiously, that we left our fellow travellers far behind. The road we travelled over yesterday was indeed terrible. I had wished to camp near the scene of the upset, but there was no water to be had until we reached the foot of the "divide" that separates the waters of the Purgatory, running north, from those of the "Rio Canadiano," running south. I was, therefore, obliged to march to this place, which is 16 miles from our last camping ground. The mountain sides and ravines were covered with grass that is called by the traders "grama," a Spanish term, which, although it means grass of any kind, is here restricted to a particular kind, (athereopogon oligostachium.) This grass seems to prefer a hilly country, is very hardy, and animals seem to thrive well upon it, although they do not like it at first.

I found to-day a species of cactus near "mamalaria," the fruit was pyriform, one inch long, and contained small round seeds of a light brown color, and was juicy and well flavored. In the waters of the stream we found specimens of the "ranunculus aquitalis," also the "symphoricaspus glomeratis," and close to the water's edge a species of "angelica."

In the afternoon Mr. Nourse and Pilka went out to hunt turkeys and deer; of the latter there are two varieties, the common deer, and the black tail, (cervus macrotis.) They did not get any, but brought some beautiful specimens of the scarlet gillia, (cantua longiflora,) and the blue larkspur, (delphinum azureum.)

The country around us bears strong evidences of volcanic action; the tops of the high bluffs are level, and present at their outcroppings a columnar structure. There are large masses and boulders of scoriaceous rock scattered about through the gorges of the mountains.

The song of the blue bird, (sialia Wilsonii,) from his airy flight in the clouds, tells the approaching cold weather, the robin now find the cedar berries ripe, and sits in the dense foliage calling to his companions to come and feast on the fruit that the frost has so delightfully sweetened for them.

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September 18.—Last night we were much annoyed by the loud snorting of one of the mules that had been fastened near some brush; he awoke us all, and we were obliged to let him loose; there were either wolves or bears prowling around our camp. This morning the mule was not to be found; we had a long hunt after him; at length Pilka found him three or four miles off in a narrow gorge. It was now so late that were obliged to give up all idea of marching. Soon Lieutenant Simpson's wagons arrived, and in the evening the ox teams of Mr. St. Vrain; the trading wagons have sustained another upset.

In the neighborhood of the camp I collected several species of compositaceous flowers; also a species of bull rush, (juncus tenuis,) and a variety of the yucca and "gilia pulchella."

Great numbers of wolves, the large grey wolf, were prowling around our camp; (canis nubilius;) it was, doubtless, one of them that had so terrified the mule last night.

Mr. St. Vrain gave me a prairie dog that he had shot; I preserved the skin, although the head of the animal was much injured by the rifle ball.

This evening, a couple of hours before sunset, I ascended a little slope that gave me a fine view of the mountain masses that were piled to the height of one thousand feet above our heads; all around me, and the valley below, were enveloped in the dark purple shadows of evening, whilst the high mountain to the east, and the plane sloping up from its base, were bathed in the golden light of the sun. Near me the landscape seemed quietly sleeping, except when one or two men gathered around the camp fires, while on the plain, at the mountain's base, the men were driving our mules down to water. What a beautiful contrast these broad masses of light and shade; this serenity of sleep with the liveliness of life.

September 19.—We had no sooner left camp than we commenced the ascent of a long hill, whose top forms the dividing ridge of the waters running north from those running south. From the top of this ridge one has a magnificent view. As the road is very tortuous, at one time one beholds the Spanish peaks directly in front; but it is only for a moment, as the road immediately bends its course to the south.

The bottom of the gorge was now comparatively level; we travelled along quite rapidly, until near the "embouchure" of the pass, when we again encountered difficult ground. Whilst riding along some distance in advance of the wagon, I discovered beyond a sudden rise that screened me, three large grizzly bears ("ursus ferox") in the middle of the road, marching directly towards me. They were then not more than 100 yards distant; I lowered my head to prevent being seen, and rode back and told Pilka to get his rifle; he hurried forward, and stooping down behind a rock waited their approach; they came to within fifty yards of him, but his rifle snapped twice; the third time he put on a fresh cap and stood up to take aim. At the loud report of the cap the bears all rose erect, snuffing the air. At last they caught sight of the cause

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of their alarm, when they scrambled up the perpendicular sides of the rocky gorge and ran off. We often afterwards congratulated ourselves that the rifle did not go off, for had the bears been wounded they would have created dire havoc amongst our mules; and they were all crowded in such a narrow pass, that it would have been very difficult to have saved any of them. There are few animals more to be dreaded than the grizzly bear.

Soon after this adventure, we commenced the passage of one of the most rocky roads I ever saw; no one who has crossed the Raton can ever forget it. A dense growth of pitch pine interferes with the guidance of the teams; in many places the axletrees were frayed against the huge fragments of rock that jutted up between the wheels as we passed; pieces of broken wagons lined the road, and at the foot of the hill we saw many axletrees, wagon tongues, sand-boards, and ox yokes, that had been broken and cast aside.

The pass was now full of the wild cherry, the black locust, the currant, and the plum. In the rocky portions we saw the pine, (p. vigidus,) the spruce, and the piñon, (P. monophyllous,) and near the dividing ridge the delicate hare bell, (campanala rotundifolia,) the flax, (L. perenne,) and through the whole extent of the gorge, the bright scarlet gillia, ("G. pulchella,") blue larkspur, the geranium Frémontia, and the lupine.

The pine has been found useful in an economical point of view, as from it is procured tar for the wagons.

We now issued upon the plains, once more to see the beautiful galardias and helianthoid composita, and listen to the lively barking of the prairie dogs. At length, after a journey of 17 miles, we encamped three-fourths of a mile above the crossing of the "Rio Cañadiano," where we found a fine stream of cool water, clear, too, as crystal, and running over a clean pebbly bottom, shaded by large cotton wood trees and willow thickets, on which the hop vine clambered, covered with a luxuriant growth of its chaffy fruit.

September 20.—As the ox teams moved too slow for me, I determined to wait for company no longer, but with Mr. Nourse and Pilka to push on for Santa Fe. So we arose early this morning, intending to camp on the "Rio Verméjo," which is 20 miles distant.

We travelled over a fine prairie, covered with a luxuriant growth of grass; in many places it had been very marshy, and was overgrown with the cat-tail, "typha," and cane grass, "arundo phragmites." These plains look much greener than those to the north of the Raton.

We saw a band of elk or warpiti, (C. canadensis.) We also saw many herds of antelope, in troops of 10 or 20, and the large grey hare were running about in all directions. Amongst the birds we discovered the turkey vulture, the raven, the meadow lark, (S. neglecta,) and the sky lark, (alanda alpestris.)

The prairie was, in many places, yellow with the senecio filifolius, and beautiful patches of the purple verbena, (V. pinnatiffida,) were constantly recurring. The Mexican poppy was abundant, and of the cacti we had the "opuntia" and "cereus cespitosa."

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At 3 o'clock, we had reached the "Verméjo," but we found no water in the river, and were obliged to proceed six miles further, where we found some pools. Here the water had a saltish taste, but was quite pleasant; the ground around the pools was whitened with a saline efflorescence. Here we obtained many beautiful crystals of carbonate of lime. There were also many places where a dark variety of this rock appeared, bulging from the earth in convex masses of three or four feet in diameter.

Our mules seemed to relish the salt grass with infinite gusto, and the water was no less pleasing to them; but wood was scarce in the vicinity of the ponds, therefore we did not feel perfectly satisfied, and at last were fain to have recourse to the artemisias.

The "obione canescens" grows so abundant as to fill the creek bottoms, and, with the yellow willow, are two of the most characteristic plants.

On the banks of the "El Rio Cañadiano," I got a curious variety of "oxybaphus," delicate branching species, and a variety of asclepias, also "œnothera sinnata."

September 21.—After a march of four miles, we reached the Cimmaroncito. This stream is composed of two large branches, each of which the road crosses about sixty yards above their junction. Soon after leaving this river, we met Lieutenant Elliot, of the Missouri volunteers; he had a long train of wagons, and was on his way to Bent's to bring up the government stores that had been left there. I now procured, through the kindness of Lieutenant Elliot, a sketch of my route from this place to Santa Fé, with all the watering places and good pasture grounds marked thereon, and much verbal information that was of great value to me. I also learned that General Kearney intended leaving Santa Fé on the 25th proximo. I therefore determined to travel as expeditiously as possible, in time to go with the army, in case my services should be required. As it was too late to reach the "Ocate" this day, I was forced to camp on the Rayada, ten miles distant from the little Cimmaron; about midway we crossed the "Poñi," which was dry, and at last reached the Rayada, which was full of excellent water. On this stream we had the "populus monilifera," and thickets of willow, and I got a beautiful scarlet plant, "chelone barbata," and a penstemon, with scarlet flowers.

In the afternoon, we tried to catch some prairie dogs by forcing them out of their holes with water. We poured bucket after bucket into their dwellings without flooding them. One dog showed itself near the mouth of its burrow, but, as soon as it saw us, again retreated.

September 22.—We started at sunrise, and, before we had gone far, passed two little rills of clear water. Continuing our journey, we reached a large shallow pool, the shores of which were covered with thick saline efflorescence; the whiteness was painful to the eye. After passing it, we entered a narrow gorge, the tops of the bluffs on each side were crowned with a stratum of amaygdaloidal trap of a dark purple color and vesicular. Presently we reached the extremity of the gorge, and ascended to a "mesa" or horizon-

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tal plain; and, when we looked to our right hand, we saw another horizontal plain yet higher than the one we were then travelling on, and covered also with a bed of volcanic rock about five feet in thickness. Keeping close to the foot of this highest "mesa," we reached the "Ocate;" as it is a cañoned, that is, is enclosed with high rocky walls, we were forced to go two miles up stream in order to reach the crossing. As it was only 3 o'clock, and I had hopes of reaching the next camping ground before dark, we continued our march, although we had already come 22 miles. We travelled until night fell upon us without finding any water. I had not yet sufficiently recovered to bear such a journey, and was obliged to get into the wagon. The night was very dark, and we travelled along with considerable difficulty, as the driver could scarcely see the road. At last we heard the joyful cry of water, and we found ourselves close by some fine pools, that were, fortunately, just in the road, or we could not have seen them. This was an old camping place, and in hunting around we stumbled on some charred sticks, that had helped to cook the dinner of those who had preceded us, and now cooked ours.

We had now reached "ponds in the prairie," 18 miles distant from the Ocate, and have made a day's journey of 40 miles, having come from the Rayada to the "ponds in the prairie."

September 23.—We had scarcely left our camp when the signs of civilization broke upon us; in moving along the valleys, we saw flocks of sheep, droves of horses, and large herds of cattle. These are guarded night and day by lads who, in the language of the country, are termed "pastores;" they were miserably clad in tattered blankets, and armed with bows and arrows; these and their big shepherd dogs constitute their sole defence, although they are subject to be attacked by the Indians, and their flocks and herds by Indians and wolves.

After a march of five miles, we reached the "Rio Moro," and passing several "corales," or enclosures, we at last came in sight of some adobe houses. The proprietor of one of those houses was an American, named Boney, who has since been murdered by his "peons." He invited us to alight and enter his house, where he treated us to milk, cool from the cellar. In his house there were a dozen fire-locks of different kinds, escopettes, fusils, rifles, and muskets. The residents of the other houses were New Mexicans. As we passed by, they proffered us some "aquardiente," or liquor. I told them that we did not wish any; at which they seemed much surprised, crying out "Vmd. no quiere aquardiente! Vmd. ciertamente no es Americano." Notwithstanding this risk of being denationalized, we refused the aquardiente. They then brought us some fresh mutton, that I consented to purchase, and it proved to be excellent.

There is very good pasture grounds along the Rio Moro. The valley is from 60 to 70 miles long, and increases in width to its junction with the valley of the Cañadiano.

Shortly after crossing the "Moro," we forded the "Rio Sepullo;" both of these streams contain an abundant supply of water. The

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Moro is 15 feet wide, and averages one foot in depth at the ford. The Rio "Sepullo" is smaller, but worthy of the greatest share of notice, as it is the point at which we again meet the road that we left at the crossing of the Arkansas. Although that road avoids the terrible cañon of the Raton, yet the scarcity of water is so great that, in dry seasons, the teams get broke down, and one is obliged to send into New Mexico for fresh animals.

During the march, we saw several immense rattlesnakes; one happened to be crossing the road directly in my path. I heard it rattle, and my mule springing back several yards and getting entangled with the leading mules in the wagon, the trace chains became unhooked, and for a little time threw the whole team into confusion.

Towards the latter part of our route, the road was strewed with fragments of hard blue limestone, that made the wagon rattle away at a great rate. After a march in all of 27 miles, we reached "Las Vegas." As it was near sundown, we deferred visiting the village until the next morning.

We soon sat down to a supper of ducks, (fulica Americana;) they were very fat, and although a species of duck not very highly appreciated in the United States, still I think it must be merely owing to prejudice. They are generally known as the common coot.

September 24.—As soon as we arose a Mexican came over to pay us a visit; he was mounted on a fine horse, and appeared to be on duty, guarding the corn fields that lay around the town, for they have no fences to protect them against devastation from the cattle that are grazing near them.

Our "amigo" rendered us great assistance in harnessing a wild mule, for we were obliged to tie the fore feet, and blindfold it, before the harness could be arranged. We now entered the town of "Las Vegas." There was a large open space in the middle of the town; the streets run north and south, east and west; the houses are built of "adobes." The "azoteas," or roofs, have just enough inclination to turn the rain, and the walls of the houses, which are continued up one foot above the roof, are pierced for this purpose. Through the midst of the town there was a large "acequia," or canal, for the purpose of supplying the town with water, and of irrigating the fields.

As we passed through, I asked one of the inhabitants if he had any corn to sell, "Si, Señor Caballero; tengo maize, elote calabazas, melones, y Chili tambien," and he soon brought me some corn on the ear, some pumpkins, melons, and red pepper; and, after I had concluded my purchases, he pulled a bottle out of his pocket, saying, "No quiere vmd. whiske." This was the alcalde. Two miles south of "Las Vegas," we reached a curious gate between high escarpments of rugged granite rocks, that looked as if the surfaces had been formed by blasting with gunpowder; here, too, a little stream finds its exit from the mountains.

At 10 o'clock we reached the village of "Tacalote," after a march of 12 miles. I was obliged to camp here or else go to the

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SAN MIGUEL.

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"Ojo Vernal," where, I was informed, the grass was very scanty. I went some distance up the creek at "Tacalote," and encamped in a fine meadow of grass, close to some corn fields. Some of the inhabitants came out, and said that I must not camp there, as my mules would get into their corn fields, but upon my promising to keep good watch over them, they agreed to let me remain.

At this place they have a great many sheep and goats, the latter are kept for their milk. These animals are watched all day by the "pastores," and driven into the "corral" at night.

I here purchased some "miel," or molasses manufactured from corn stalks, this process is very laborious; all night and day one hears the pounding of their mauls, with which they bruise the corn stalks.

In the evening a lad brought me some "melones" and "sandias," musk melons and water melons, but they were so unripe that none of us could eat them. The New Mexicans have a habit of pulling their fruit before it is ripe.

September 25.—The plants that occur are but a repetition of those found in the Raton; the mountains are clad with the pine, the cedar, and the "piñon;" the common thistle occurs in great abundance, and in the corn fields we find the cockle burr, "xanthium strumarium," the sage (salvia azurea,) the sand burr, and various species of the sunflower tribe.

After we had marched six miles, we reached a celebrated spring, "Ojo Vernal." It lies at the foot of a very high bluff with a flat top. The water was indeed delightful, but there was no good grass in the neighborhood.

We stopped here a little while to taste of this delightful spring, and then proceeded seven miles further, to the village of "San Miguel. This town is embosomed by high rocky ridges, that rise up in succession, until lost in aerial mists of distance. In the centre of the town there is a large church, whose front is flanked by square towers, each containing several bells, and crowned with crosses.

On the north side of the town flows the beautiful "Rio Pecos." As I passed the river I noticed the women passing and repassing with immense ollas or jars for carrying water, these they balanced upon their heads, and this custom causes them to walk with great dignity. Many of the young women had their faces hidden under a thick coat of whitewash, and many had bedizened their faces with the juice of the poke berry.

At one place there was a group of women busy washing clothes. They were most of them clad in a single under garment, and waded in and out of the water without regarding the presence of an "Americano."

The river is three feet in depth, and from 16 to 20 in width; there is a rude bridge constructed here for the convenience of foot passengers.

As there were no pasture grounds near the village, I was forced to buy "zacate" for my mules.

September 26.—This morning we passed through the village of

"San Miguel," and thence up the valley of the Pecos. Near the cemetry we noticed a number of tame pigeons; these and chickens were the only fowls that we noticed.

Our road now lay by the foot of a high bluff that raised its crest 600 feet above the valley. Its sides clothed with groves of cedar and piñon. The groves on each side of the road were full of stellar jays, (garrulus stelleri,) red shafted flickers, and robins; the woods were vocal with the varied notes of these lively birds.

As we journeyed along we were continually seeing most motly groups of human beings; sometimes we met long trains of men and women mounted on mules; the señoras with their heads enveloped in their "rebosas," the men with their pantaloons open at the side from their hip down, thus displaying their ample drawers of white linen, and with their heels armed with immense jingling spurs. Sometimes we met single couples mounted on the same mule. Most of these men were armed with naked swords that lay close against the saddle. At one time we passed a group of Indians; they had pack mules laden with buffalo robes and meat. Their jet black hair was tied up in short stumpy queues with some light colored ribbon. They told me that they were "Teguas" Indians; that they had been far out on the prairies trading with the Camanches, and were now going to sell their robes in Santa Fé.

As we neared the ancient village of Pecos, we crossed the river in the neighborhood of a fine spring, where we found two large trains of wagons; one belonging to Mr. McGoffin, and the other to Mr. Algier; they were repairing wheels, for the dryness of the atmosphere is such that nearly all the wagons that cross the prairies must here have the tires cut.

In the afternoon I went out upon the hills to see the ancient cathedral of Pecos. The old building and the town around it are fast crumbling away under the hand of time. The old church is built in the same style as that of "San Miguel," the ends of the rafters are carved in imitation of a scroll; the ground plan of the edifice is that of a cross. It is situated on a hill not far from the winding course of the river. High ridges of mountains appear to converge until they almost meet behind the town, and through a little gap one catches sight of a manificent range of distant peaks that seem to mingle with the sky.

The village of Pecos is famed for the residence of a singular race of Indians, about whom many curious legends are told. In their temples they were said to keep an immense serpent, to which they sacrificed human victims. Others say that they worshiped a perpetual fire, that they believed to have been kindled by Montezuma, and that one of the race was yearly appointed to watch this fire. As the severity of their vigils always caused the death of the watchers, in time this tribe became extinct. Again, I have been told that some six or eight of their people were left, and that they took the sacred fire and went to live with the Pueblos of Zuñi.

The scenographical arrangement of the surrounding country is remarkably picturesque; the view of Pecos, as it now lies, without the least addition, would form a beautiful picture, and more than a

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RUINS OF PECOS.

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picture, for every cloud, every degree that the sun moves, gives such varied effects to the landscape, that one has a thousand pictures; but their effects are so fleeting, that although they last long enough to delight the spectator, it would yet perplex the artist to catch these changes. For my part, I tried, and tried in vain, until at last some large night herons came sweeping over my head, and warned me that the shades of evening were drawing on, when I returned to camp.

September 27.—Santa Fé is now within 29 miles of us, and we at length feel as if we were about to reach the "ultima thule" of our wishes.

Although the road was difficult on account of the high hills and deep defiles over which we would have to pass, yet I determined to enter Santa Fé this day. I proceeded somewhat faster than the wagons, and before long overtook two Spaniards on their way to the same place. As they knew the route perfectly, I accepted their proffered guidance through the short cuts by the cañons in the mountains. At length we reached Armijo's cañon. Here we found plenty of cool water, where we all dismounted to allow our mules a little rest, when my friends produced from their wallets some sweet "bizcochos," which they persisted in sharing with me. I by good luck had some buffalo tongue in my pocket, that added not a little to our rural repast. We again mounted, but, before proceeding far, met a man driving a "carreta." My amigos now signified their intention of stopping some time, and, bidding me "vaya con dios," I left them and hurried on, for a time following the course of the stream which is a tributary of "Rio de Galisteo."

I now left the stream and commenced the steep ascent of the mountains, whose sides are overgrown with the pitch pine and the piñon. On the far side of the steep I met Colonel Ruff, of the Missouri volunteers, returning to the United States, and Judge Houghton, one of the judges of the supreme court of New Mexico.

We stopped to exchange what news we had, and then separated, I with a new impulse to move forward, for I learned that Santa Fé was but 12 miles distant. About 5 o'clock I came in sight of a square block of mud buildings one story high. In a little while after, I caught sight of the flag of my country waving proudly over some low flat roofed buildings that lay in the valley. I knew this must be Santa Fé. I hurried on, and was soon seated amongst my friends, who looked upon me as one awakened from the dead.

28*th*.—I was much surprised with the manners of the Mexicans at a funeral. They marched with great rapidity through the streets near the church, with a band of music. The instruments were principally violins, and these were played furiously, sending forth wild raging music. The corpse, that of a child, was exposed to view, decked with rosettes and flaunting ribands of various brilliant hues, and the mourners talked and laughed gaily, which seemed to me most strange. I was told, too, that the tunes played were the same as those which sounded at the fandangoes.

In the morning I called upon Governor Bent, who, to all the

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qualifications necessary to his office, possesses those of a long residence in this country, a constant intercourse with the people, and an intimate knowledge of their language and character.

In the afternoon I strolled through the "plaza," or public square. On the north side is the palace, occupying the whole side of the square. On the remaining sides one finds the stores of the merchants and traders, and in the centre of the square a tall flag staff has been erected, from which the banner of freedom now waves. There all the country people congregate to sell their marketing, and one constantly sees objects to amuse. Trains of "burros" are continually entering the city, laden with kegs of Taos whiskey or immense packs of fodder, melons, wood, or grapes. Our own soldiers, too, are constantly passing and repassing, or mingling with the motley groups of Mexicans and Pueblo Indians.

The markets have, in addition to the articles already mentioned, great quantities of "Chili colorado," and "verde," "cebollas" or onions, "sandias" or water melons, "huevos" or eggs, "queso" or cheese, and "hojas" or corn husks, neatly tied up in bundles for making the cigarritos, "punche" or tobacco, "uvas" or grapes, and "piñones," nuts of the pine tree, (pinus monophyllus.) These last are slightly baked to make them keep, and are brought to market in great quantities. Besides these things, there are many varieties of bread, and several kinds of meat. The Pueblo Indians bring in great quantities of peaches which are here called "duraznos." In the evening I attended a ball, here styled a fandango. The Mexican ladies had laid aside their "rebozas," and were clothed much after the manner of our own females. Stuffs most rich, and skirts of monstrous width or fullness. While sitting down they were wrapped in splendid shawls. These were generally thrown over the head like the reboza. They gazed round the room with great complaisance as they smoked their cigarritos. Waltzing forms the chief part of all their dances. The principal ones are the "cumbe," and the "Italiano." These people have an excellent notion of time, fine voices, and seemed to be enthusiastically fond of music. They are polite to excess, and I hear them often exclaim at what they call rudeness of the Americans, saying "no tienen vergüenza," for a Mexican never even lights his cigarrito without asking your consent, "con su licencia señor."

At this dance I had the pleasure of tasting some of the wine from "El passo del Norte," which in its delicious flavor realized all I had anticipated.

September 29.—As I had found orders from General Kearny, directing the survey of New Mexico, with Lieutenant Peck of the topographical engineers, I set out this morning to visit the gold mines, between thirty and forty miles to the south of Santa Fé. Having made all our preparations yesterday, we were enabled to get off very early this morning. The first nine miles of our road led us through groves of cedar and piñon; at length we got upon the bare valley, where nought is to be seen but the cactus, and a scant growth of grass, and the yucca; and along the road great numbers of horned lizzards. Towards the latter part of the day

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we entered a very sandy country; here lay huge masses of sandstone and fragments of immense petrified trees. We soon commenced clambering up the mountain side, and at last reached the "placero" or "real viejo;" here we made diligent inquiry for a Mr. Waters, at whose house we wished to stay, as we understood he was the only American in the village. We found he had gone off on a hunt. We endeavored to get some of the people of the house to admit us, but they did not seem to like our appearance, and refused to let us stay with them. It was now quite late, we were very hungry, and our mules had had nothing to eat since early this morning, and the country around was as sterile a piece of ground as one could wish to see. "Siempre dija la ventura, una puerta abierta." So, after a great deal of persuasion on our part, they put our mules into a corral, and gave them some corn. No fodder was to be had here; in fact, there was scarcely anything to be had in the village. The houses were the most miserable we had yet seen, and the inhabitants the most abject picture of squalid poverty, and yet the streets of the village are indeed paved with gold. All along the bottom of the stream and in the heart of the town you see holes scooped out by the gold diggers. After doing our best to make ourselves agreeable to the people, they consented to let us spend the night in a hovel, next door to a mill, in which a burro was busily at work grinding gold ore. Some Indians now entered the town, with trains of burros loaded with musk melons. As we began to feel the cravings of hunger, we purchased some melons and bread, on which we tried to make our suppers We got our saddles and saddle blankets, and endeavored to form them into a bed on the earthen floor of our luxurious "posada." At length we received the news that a certain Señor Don Ricardo had arrived, who was an American, so we at once repaired to his house. Conceive our delight in meeting with a countrymen, Mr. Richard Dallum, the Alguacil of New Mexico. He immediately invited us to come and stay at his house, and gave us an excellent supper.

From the "portail" of his house we noticed holes dug in the sides of a hill of sand in front of us; these were the vestiges o the gold diggers. The mountains of sand were based on masses of granite, specimens of which we collected.

This village contains about 200 inhabitants, who raise great numbers of sheep and goats. In the neighboring valleys they graze 5,000 sheep. Some years ago they raised many more, but the constant depredations of the "Navajoes" have caused a great diminution in their flocks.

September 30.—In company with Mr. Dallum, we started this morning on a tour of exploration. One-fourth of a mile higher up the ravine we entered another little town; our way was on all sides full of holes, and sometimes deep wells that had been sunk in search of the precious metal. We saw many miserable looking wretches, clothed in rags, with an old piece of iron to dig the earth, and some gourds, or horns of the mountain goat, to wash the sand. They sit all day at work, and at evening repair to some

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"tienda" or store, where they exchange their gold for bread and meat.

We now reached the house of a Frenchman, who seemed to be most extensively engaged in mining; he had three mills, and one was then at work. This mill, a specimen of all the others, was of rather rude construction; it consisted of a circular pit ten feet in diameter, and about eight inches deep; the sides and bottom lined with flat slabs of stone. In the centre of this pit an axis was erected, from which three beams projected horizontally. To the longest arm a burro was attached, to the two others large blocks of stone were attached with cords, so that their flat surfaces were dragged over the bottom of the pit.

The ore that is here found in quartzose rock is broken into small pieces and thrown into the pit; water is also poured in, and donkey holds his monotonous round; the mixture now attains the consistency of thin mud; a couple of ounces of quick silver are thrown in; this forms an amalgam with the gold, and when the pit is cleared from the water, the amalgam is collected from the crevices between the stone slabs, it is tied up in a piece of rag or buckskin, thrown into a crucible and the mercury sublimed.

Around this mill we found iron ore of remarkable purity, which is dug out with the gold.

The proprietor of this mine very generously gave us as many specimens of the ore as we wished. The gold exists in small particles, visible to the eye, scattered through a quartzose gangue.

We now ascended to the mines. Here we found deep wells; they are ascended and descended by the means of notched pine trees that extend diagonally across. I procured a specimen from a vein that had been just struck. These pieces had a smoky appearance, as if produced by the flame of a candle, but the stain is indelible. The mountain sides were scattered with fragments of granite and rock containing gold. We now returned to the house of our entertainer, who refused to receive any remuneration for the trouble we had caused him, and who gave us many specimens of the ore. Having taken our leave, and inquired our route to the new mine, or "Tuerto," as it is generally called, I suppose from the crooked stream that runs near, we set out on a difficult path across the mountains. We passed up a steep ravine, so steep that the rolling of stones had worked a straight road that looked as if timber had been dragged down the hillside. As our mules climbed up, the loose stones came clattering down. We soon reached the summit, and commenced the descent. Here we saw much dark blue limestone; some, in fact, almost black. On the road we met Señor Don José Chaviz, of Padillas; he was attended by one of his peons, and was going to the same place whither we were bound. We soon entered the valley that separates the two ranges of mountains in which the gold mines are located.

From this place we had a fine view of the mountains, and one is struck with the arrangement of the lines, they being nearly straight, and running up pyramidically, showing the loose sandy nature of of the soil. After a ride of eight miles we reached the village of

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THE GOLD MOUNTAINS NEAR TUERTO.

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Tuerto, and inquired our way to the house of Mr. Richard Campbell, where we were kindly received, and most hospitably treated. He showed us some fine specimens of native gold that had been found in the neighboring valleys, and were scattered through the detritus that is formed by the crumbling down of the auriferous rocks of the mountain. One specimen was worth $15.

In the evening we visited a town at the base of the principal mountain; here, mingled with the houses, were huge mounds of earth, thrown out from the wells, so that the village looked like a village of gigantic prairie dogs. Nearly all the people there were at their wells, and were drawing up bags of loose sand by means of windlasses. Around little pools, men, women, and children were grouped, intently poring over these bags of loose sand, washing the earth in wooden platters or goat horns. One cannot but feel pity for these miserable wretches, and congratulate himself that he does not possess a gold mine. Even the life of the poor pastores is much preferable to that of these diggers of gold.

Tuerto contains about 250 inhabitants. It is situated on a ravine, that just furnishes sufficient water for this place and the town at the base of the mountains, which is 1½ miles distant. Some of the people own large flocks of sheep, which they keep in the valley of the Pecos.

In the evening we saw the "villanos" milking their goats. This business requires considerable dexterity, and is not one of the least amusing scenes in New Mexico.

October 1.—We now started to examine the mines of the new placer. Mr. Campbell kindly furnished us mules, in order that ours might have an opportunity to rest and to graze. We first visited a lead mine, situated near the road that runs to St. Antonio; it is in a direction nearly south, situated at the foot of the mountains, and overlaying a bed of fossiliferous limestone. We collected specimens of the lead ore, and the limestone; then, proceeding eastwardly, commenced ascending the mountain. Our course now changed towards the north. Near the summit of the mountain we visited a large copper mine. Mr. Campbell proceeded to enter with great caution, and told us that he feared least some evil disposed Mexicans should be lurking in these caverns, for there were many discontented spirits about the country, trying to revolutionize the people, and some were said to dwell in these mines and caverns.

We found beautiful specimens of ore of copper of various kinds. Mr. Campbell ground up some with the aid of a couple of stones, and after a little washing showed us a great many particles of gold and silver; indeed, the ore was quite rich with these metals. This vein went through a compact limestone that is worn as if a water course once ran through the place now occupied by the ore. The projecting pieces of rock are rounded, and the sides of the passage worn into deep rounded fissures that our host calls pockets; and he tells us that in them the richest ores are found. Around the mouth of the mine we saw pieces of carbonate of lime scattered; it had been dug out with the copper ore.

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We continued our northern course across the mountain, and soon commenced to descend, and in our route stopped at Mr. Campbell's gold mine. Here the ore is composed of a very porus and vesicular rock, that crumbles with a slight blow, and one can easily break off pieces with the hand from the roof and sides of the mine. The vein is nearly horizontal, and its bearing a little north of west, (N. 50° W.,) and runs through compact limestone. The sides of the mine are full of pockets and rounded projections. Mr. Campbell says that ore found near the surface of the earth proves the richest, and that he finds the gold does not defray his expenses when he penetrates to a great depth. Here, too, we find carbonate of lime; it occurs in rhombohedral crystals. These mines are much more extensively worked than those of Real Viejo, and, notwithstanding the scarcity of water, I have been told by several persons that not less than 2,000 people congregate here in the winter season, when they can get water from the snows. These workers spend the greater part of their time under ground, living on "atolé," a dilute kind of corn mush; sometimes coming forth to the light of day, when they wish to sell the product of their labor.

The value of these mines cannot very well be estimated now, as there have been many improvements in the methods of working gold, which, when adopted at these mines, may produce a great increase in their annual yield. At present, none of the owners of these gold mines have ever become wealthy by their mining operations, and I have met several who have sunk all they had in searching for gold.

Mr. Campbell tells me that he got from his wells one piece worth $700, and, at another time, a piece worth $900; these were at first carried off by the workmen, but were of such value that the whole truth, with reference to the theft, was exposed, and our host recovered his property.

The raising of sheep would be much more profitable if it were not for the depredations of the Navajoes. Even now great numbers are raised, whose flesh is as fine as any I have ever tasted. Some of the "Ricos" on the Rio del Norte are said to own 40,000 sheep. Wool is not considered very valuable, and can be bought for 4 cents a fleece, or a proprietor will permit any one to shear his sheep for $1 the hundred.

The houses throughout the country are furnished with mattresses, doubled up and arranged close to the walls, so as to answer for seats; these are covered with beautiful Navajoe blankets, worth from 50 to 100 dollars. The walls, midway up, are covered with calico, to prevent the whitewash rubbing off; and the whole interior of the houses of the wealthy is covered with mirrors. All the hidalgos pride themselves on allowing nothing but silver to approach their tables; even the plates are of silver. But, with all this air of wealth, true comfort is wanting; and very few of our blessed land would consent to live like the wealthiest Rico in New Mexico.

While we were at Tuerto the following notice was received,

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which, as it gives a view of the civil officers appointed for this territory, may be of interest:

"Aviso."

"Hallandome debidamente autorizado por el Presidente de los Estados Unidos de America, por la presente, hago los siguientes nombramientos, para la gobernacion de Nueva Mejico, Territorio de los Estados Unidos.

"Los empleados asi nombrados seran obedecidos y respetadas segun corresponde."

CARLOS BENT,	sera	*Gobenador.*
DONACIANO VIGIL,	"	*Secretario del Territorio.*
RICARDO DALLUM,	"	*Esherif Mayor* (*Alquacil.*)
FRANCISCO P. BLAIR,	"	*Promoter fiscal* (*Mayor.*)
CARLOS BLUMMER,	"	*Tesorero.*
EUGENIO LERTENSDORFER,	"	*Yntendente de cuentas püblicas.*

Joab Houghton, Antonio José Otero, y Carlos Bavbien, seran jues de la suprema corteda de justicia, y cada uno en su districto, sera jues de circuto.

"Dado en Santa Fé, capital del Territorio de Nueva Mejico, esta dia à 22 de Septembre, 1846, y el 71° de le independencia de los Estados Unidos."

S. W. KEARNY,
General de Brigada del Egercito de los Estados Unidos."

October 2.—This day we left our kind friends, and Señora Campbell bade us adieu with the greatest reluctance, assuring us that her house, and all it contained, were ever at our disposal; and although poor, yet we would never find that her hospitality was limited by the narrowness of her circumstances. In vain we pressed them to allow us to compensate them for their trouble; they would not receive any remuneration.

We now travelled rapidly, in order to reach Santa Fé before dark; our mules, well laden with specimens, trotted along quite briskly; we soon reached Rio de Galisteo; on one of its tributaries we found evidences of coal, and the bed of the main creek was white with saline efflorescences. Crossing the creek we entered a little vale, traversed in various directions by walls of trap; at one place we saw a wall that looked, at a little distance, as if made by human art; it was pierced as if for windows and doors. A stranger whom we met insisted that this dike was one of the vestiges of the "Indios," who lived here long long ago. But the Cyclops alone could have worked with such vast materials as these. The planes of the joints and cleavage have formed the mass in fragments, consisting of rhomboidal prisms, whose axes are perpendicular to the cooling surfaces.

As we neared Santa Fé, we overtook a carreta loaded with little crates filled with grapes; we bargained with the Pueblo Indians, who were driving, and for a "media" procured as many bunches as we wished; these, with some Spanish bread, formed our noon

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repast, which we washed down with delicious water from the little arroyà that flows by the village of Cienèga.

In a little while we reached Agua Fria, and soon came in sight of the city of Santa Fé. By the roadside we saw many cortejos, some half shaded with cotton-wood trees and surrounded by corn fields. Soon Fort Marcy came in view, and our glorious flag, with its graceful stripes, playing in the wind; and before the sun went down we found ourselves once more in the capital of New Mexico.

October 3.—We employed the day in packing up our collection of minerals, bird skins, and the like, in order to send them on to the department as soon as possible.

I called on Colonel Doniphan, and spoke to him with regard to the procuring of an escort through the country of the Navajoes; he most willingly offered me every facility, and proposed giving me a letter to Colonel Jackson, who was now near Cibolléta, and he would furnish the escort.

In the evening we visited Fort Marcy. It is situated on a prominent point of the bluffs commanding the city. The distance of the centre of this work, from the flag-staff in the plaza, is but 664 yards. The whole of the interior is defiladed from all the surrounding heights within range; 10 guns may be brought to bear upon the city. The slopes are revetted with adobes. The block-house and magazine are constructed of pine logs one foot square. The only approachable point is guarded by the block-house, which also assists to protect the entrance of the fort.

October 4.—We were early awakened with the ringing of the campanetas, summoning the good citizens of Santa Fé to morning mass at the parroquia, or parish church. I had a great desire to see the interior of this church, which, with the "Capilla de los Soldados," are said to be the two oldest churches in the place, and were doubtless those alluded to by Pike, when he says, "there are two churches, the magnificence of whose steeples form a striking contrast to the miserable appearance of the houses." During the noon service I attended the church. The women, veiled in their rebozas, sat, after the Turkish fashion, on the bare ground to the right hand side of the aisle. The men stood up, except when the ceremony of the church required them to kneel. They kept on the left hand side of the church. The body of the building is long and narrow; the roof lofty; the ground plan of the form of a cross. Near the altar were two wax figures the size of life, representing hooded friars, with shaved heads, except a crown of short hair that encircled the head like a wreath. One was dressed in blue and the other in white; their garments long and flowing, with knotted girdles around the waist. The wall back of the altar was covered with innumerable mirrors, oil paintings, and bright colored tapestry. From a high window a flood of crimson light, tinged by the curtain it passed through, poured down upon the altar. The incense smoke curled about in the rays, and, in graceful curves ascending, lent much beauty to the group around the priests, who were all habited in rich garments. There were many wax tapers burning, and wild music, from unseen musicians, fel

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FORT MARCY AND THE PARROQUIA—SANTA FÉ.

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pleasantly upon the ear, and was frequently mingled with the sound of the tinkling bell.

October 5.—The plaza was now our place of daily promenade, as one sees more of character displayed in the market place than at any other public assembly. No one can visit this country without being struck with the inveterate habit of the people for gambling. The word "monte" is one of the first a stranger learns. In the market place, by the road side, nay, almost everywhere, you will see the "villanos" seated around, in little groups, deeply absorbed in their games. But, although they carry this vice to great excess, they are extremely temperate in their meats and drink. The term borrachon (drunkard) is considered one of the most opprobrious epithets in their language.

The Spanish women make excellent bread, and great quantities are exposed for sale in the plaza. I understand that the flour is sifted by hand, and, instead of yeast, they use the dough from a previous day's mixing. One kind of flour is quite coarse and dark; this sells in Taos for $2 50 the fanega, (144 pounds.)

In the evening I made a sketch of the parroquia, although mud walls are not generally remarkable; still, the great size of the building, compared with those around, produces an imposing effect.

Fort Marcy is seen lying close on the top of a high bluff, and behind it rises the tops of magnificent mountains.

The house of Padre Ortiz, on the right hand side of the church, has a fine portail in front, being one of the best dwelling houses in the city.

October 6.—This morning I visited the "Capella de los Soldados," or military chapel. I was told that this chapel was in use some fourteen years ago, and was the richest church in New Mexico. It was dedicated to "Nuestra Señora de la luz," (our lady of light;) in the façade, above the door, there is a large rectangular slab of freestone elaborately carved. It represents "our lady of light" in the act of rescuing a human being from the jaws of Satan, whilst angels are crowning her; the whole is executed in basso relievo. One here finds human bones and sculls scattered about the church; these belonged to wealthy individuals who could afford to purchase the privilege of being deposited beneath the floor of a building in which so many orisons would be offered to Heaven, hoping that these prayers would procure absolution for their sins. But a few years ago the roof of the church fell in; no more prayers have since then been offered there, and the wealthy have not even found a quiet resting place.

To-day I gained much information with reference to the ruins of Pecos, but it does not differ from the accounts given in that excellent work called "Commerce of the Prairies," by Gregg. I asked how it happened that the old church should have been built in the form of a cross, and was told that it was erected under the direction of the Jesuits, who founded schools there, and who labored much to reclaim the Pecos Indians from their superstitions. Strange what influence these superstitions have on enlightened

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men. The person with whom I was conversing, assured me that, some ten or fourteen years ago, a wealthy individual of Santa Fé, who had been admitted to the estufas, or vaults at Pecos, and who had profaned the "eternal fire," had been ever since perfectly deranged.

October 7.—Again I visited the ruins of the military chapel, in the plaza, in order to make a sketch of a large tablet that stands back of the altar. This is a beautiful piece of art, and represents the principal Mexican saints. Above all is Santa Maria, then St. Jago, riding over the turbaned heads of his enemies; on the right is St. Juan de Pomasan, the back ground ornamented with a representation of an *aqueduct;* under him is St. Francis Xavier, baptizing the Indians; and in the back ground conical huts, such as are built by the rudest tribes. On the left is St. José, and below him St. Francisco de Santa Fé, standing on two globes. At the bottom of the tablet are two elliptical spaces, containing the following inscriptions:

+	
A DEVOCIONDE	IDES VESPOSA
SENOR DN. FRANCO. ANT.	DA. MARIA IGNACIA
MARIN DLVALLEGOVE	MARTINEZ DE
NADORI CAPIN GENDES	VGARTE ANO
TE REINO.	E 1761.

Which we deciphered as follows: A devocion de Señor Dn. Fco. Ant. Maria del Valle, governador Y capetan general deste reino. Y de Su. esposa Da. Maria Ignacio de Ugarte Año Christiano 1761. The church was doubtless erected many years previous.

Scattered about through New Mexico, one frequently meets with fine specimens of art, particularly oil paintings. These were sent over from old Spain; and, at one time, the Spaniards used to send over fine workmen and artists to construct and adorn the churches. My Spanish landlady has a fine picture of a female saint, that I have endeavored to purchase from her; but she conceives that it represents the "virgin santissima." It has a dagger sticking in the heart; this I called her attention to, but she could not be induced to part with it.

Before proceeding further, I deem it proper to introduce, at this place, the notes furnished by Lieutenant Peck, with reference to that portion of New Mexico situated to the north of Santa Fé, and which had been examined by Lieutenant Warner and Lieutenant Peck before I arrived.

These notes form an important portion of this report, which would be incomplete without them. They properly belong to the body of the work, and should, therefore, be placed in it, rather than in an appendix.

"The name Taos, originally given to the region of country embracing the head waters of a river of the same name, has long since, by universal custom, been applied to the particular settlement of San Fernandez. This town is situated at the junction of the two

principal forks of the "Rio de Taos," and 4 or 5 miles from the western base of the Rocky mountain range. Like most of the New Mexican towns it consists of a collection of mud houses, built around a miserable square or plaza. It contains a mixed population of 700 or 800 souls, and, besides being the capital of the northeastern department, possesses little to interest the traveller.

Three miles to the southeast is another town, of about equal pretensions, called the "Rancho de Taos;" whilst at about the same distance to the northeast is the celebrated "Pueblo de Taos." This village, interesting in itself as a curious relic of the Aztecan age, is rendered still more so by the recent tragic scenes that have been enacted within its walls. One of the northern forks of the Taos river, on issuing from the mountains, forms a delightful nook, which the Indians early selected as a permanent residence. By gradual improvement, from year to year, it has finally become one of the most formidable of the artificial strongholds of New Mexico. On each side of the little mountain stream is one of those immense "adobe" structures, which rises by successive steps until an irregular pyramidal building, seven stories high, presents an almost impregnable tower. These, with the church and some few scattering houses, make up the village. The whole is surrounded by an adobe wall, strengthened in some places by rough palisades, the different parts so arranged, for mutual defence, as to have elicited much admiration for the skill of the untaught engineers.

It was to this hitherto impregnable position that the insurgents of January 7, 1847, retreated after the skirmishes of Cañada and Embuda; and here made a final stand against the American forces. The history of the bloody siege, lengthened resistance, and final capture of the place, furnishes sufficient evidence of its strength. For weeks in succession they had, in former days, resisted the attack of overwhelming numbers of their wild prairie enemies, and never had the place been reduced by their Spanish conquerors. Built of "adobes," a material almost impenetrable by shot, having no external entrance except through the roof, which must be reached by moveable ladders, each story smaller than the one below, irregular in its plan, and the whole judiciously pierced with loop-holes for defence, the combination presents a system of fortification peculiarly "sui generis."

These three towns constitute the principal settlements in the valley, though there are some scattering houses along the water courses. The valley may be eight or nine miles in length from east to west, and some seven or eight miles in width from north to south, embracing about sixty square miles. Only a small portion of this is under cultivation, or indeed ever can be, as no rain falls here except during the wet season. It is necessary to irrigate all the cultivated land, and the small supply of water fixes a limit, and that a very narrow one, to all the tillable land. In point of soil, the valley of Taos compares favorably with other portions of New Mexico; and though snow is to be seen in every month of the year, on the neighboring mountains, wheat and corn ripen very well on the plains. These last are the staple productions of the country;

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though beans, pumpkins, melons, and red pepper, are raised to some extent. The hills are covered with very good grass, which furnishes subsistence to herds of cattle and horses, as well as to fine flocks of sheep and goats. In them lie the principal wealth of the inhabitants.

Taos is, by nature, almost isolated from the remainder of New Mexico. On the east rise the high peaks of the main Rocky mountain chain, whilst a spur of the same range puts out on the south quite to the banks of the Rio del Norte. On the north and west are the high bluffs which mark the beginning of the extensive "llanos," or table lands. A wagon road of some difficulty has been opened through the southern spur, which leads to Santa Fé, though the communication is usually kept up by the shorter mule-road, over the highest point of the spur.

Setting out from San Fernandez at 10 o'clock, we travelled fifteen miles in a southwesterly direction, nearly parallel with the course of "El Rio de Taos," and over an undulating country, the gravelly rolls of which were everywhere variegated with clumps of cedar and scattering piñons. But, from this point to Santa Fé, there is no grass. Crossing a small stream of clear water that flows from a fine spring, we entered a narrow defile and commenced the ascent of the mountain. For 2½ miles the bridle-path is extremely tortuous and rugged, and rendered difficult by numerous fragments of rock. The mountain rises 2,000 or 2,500 feet above the river at its base, and is composed of a hard slaty rock, which breaks down into angular fragments, with sharp cutting edges. The dip of the slaty formations is to the southwest, and nearly vertical. When the broken fragments are removed, the rock presents numerous angular points, which stand out like spikes, and make the ravelling very difficult for animals. The road leads along the summit for some distance, and from it we had a fine view of the cañon of the Rio del Norte, and the extensive table land through which it passes. Far as the eye could reach, the brown and burnt table land stretched northward and westward, unbroken save by the deep channels worn by the running waters.

Turning southward, the bridle-path again descends for two or three miles, leading through a succession of mountain glens, until it emerges into the beautiful valley of El Rio de San Luisio. This is a stream of pure water that flows from the mountains, affording water to irrigate a few fields.

I noticed a few houses in the valley above the crossing, but the village of Embudo is about a mile below. There we found some 300 or 400 of the meanest kind of rancheros, who seem to derive a subsistence from the narrow fields and some few flocks of goats and sheep. There being but little pasturage, they are unable to raise many horned cattle or horses, though their goats manage very well to pick a subsistence from amongst the rocks. We stopped for the night at the house of Señora Valdes, and, after a ride of 29 miles, found goats milk and "tortillas" palatable.

It being the season for making molasses, they were all busy in laying in a winter's supply.

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They cut the stalks of the maize, or Indian corn, and, after stripping it of the leaves, pound it with heavy wooden mallets until it is reduced to a pulp; after steaming it sufficiently, they express the juice by means of a rude press, and then evaporate it to the proper consistence in earthen jars. Leaving Embuda in the morning, a half hour's ride brought us to the field on which the gallant Captain Burgwin, U. S. dragoons, so signally defeated the united Mexican and Indian forces, in January, 1847. The road here is so narrow, that two horses cannot walk abreast, and it is flanked on each side by high precipices.

The rocks rise in abrupt masses on either side; on the west terminating in a level table, capped with a sheet of lava. Amidst these confused masses of broken sandstone and lava, numerous cedars and "piñons" have caught root; and here it was that the combined forces lay in ambush to surprise Captain Burgwin's little detachment. After passing the battle-field, the road continues to follow up the dry bed of a mountain stream, until it reaches the summit, 3 miles from Embudo, where it again descends through a similar ravine, to the town of "La Joya." This is the most northern settlement on the Rio del Norte. Just here the stream breaks from the rocky cañon, and the hitherto pent up channel spreads out into a valley near half a mile in width. This marks the beginning of the river settlements, which may be regarded as continuous for 150 miles. On the plain we saw corn and wheat, and, for the first time, found orchards of peach and apricot trees. Melons, too, were abundant, but of inferior quality, whilst hanging in festoons, the bright colored pepper, or "Chili colorado," adorned every house.

Our road now lay along the east bank of the Rio del Norte; sometimes passing through the bottom itself, and sometimes ascending the gravelly bluff. On our left hand the country rolls away to the base of the Rocky mountains, presenting little else than a succession of gravelly hills, whose sides were covered with dwarf cedars. On the right hand, or west bank of the river, the high bluff of the table land reaches quite to the water's edge, some 3 or 400 feet in height. The broken section shows a formation of horizontal sandstone, capped with the dark colored vesicular lava.

This lava sheet appears to have extended over a vast expanse of country. It forms the capping or upper formation of all the table lands in Upper New Mexico, on both sides of the mountains; and its broken fragments are every where strewed along the beds of the streams, giving an air of loneliness and desolation to the scenery. The next settlement, or village, is "Los Luceros," a town of little importance.

Fifteen miles below "La Joya," is a town, or pueblo, named San Juan. The houses here are built of mud and palisades. They appear to have a dry trench, in which a row of palisades, from 6 to 8 inches in thickness, is planted; the interstices of which are daubed with the clayey earth from which they make the "adobes" that are used in building their walls.

They enter into their houses through the top, by means of move-

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able ladders; a mode, I think, peculiar to Pueblo Indians. The idea may have originated from the necessity of defending themselves against their wild enemies, and is now quite extensively practised amongst the different bands of Pueblos.

These Indians have very fine fields of corn, and I noticed particularly their orchards of peach and plum trees. The Indians cultivate almost all the fruit that is grown in the country. One may usually distinguish an Indian settlement, on approaching it, by the clump of trees; whilst the indolent Spanish settlers seldom take the trouble to plant them.

Just opposite "San Juan," is the mouth of the "Rio Chama," one of the western affluents of the "Rio del Norte." It flows from the northwest, through a beautiful valley, and, like the other streams of the country, has a narrow bottom, along which the people have settled. It is through this valley that the famous mule trail from Santa Fé to the "Pueblo de los Angeles," in California, finds its way to the Cordilleras. Towards the head waters of the river, fine grass is found, and the country is well adapted to the raising of stock; but all attempts at settlement above the "Abiquiu" have failed from the depredations of the Utah an Navajo Indians.

Between Abiquiu and Chama, a small branch enters the main stream, flowing from a group of springs, at which a village is built, called "Ojo Calienté." The largest of these springs is 16 or 18 feet in diameter, and the water in the basin presents the appearance of boiling, in consequence of the continued escape of sulphurated hydrogen gas. Other small springs exist, and from all a highly ferruginous deposite is formed. These waters have been recommended by Doctor Nagle, of Santa Fé, in many chronic diseases, and always with success.

Five miles from "San Juan," is the town of "Cañada," a village of 300 or 400 inhabitants, built on a slight roll of land, one mile from the river. At this point, the Santa Fé road leaves the river again, and, after crossing an elevated tongue of land, enters the valley of the "Rio Tezuque." Several settlements of Spaniards and Indians are to be seen along the stream, the principal of which are "Cuyamanque," and "Tezuque," both Pueblos. From the village of Tezuque, it is but five miles, over a cedar hill, to the town of Santa Fé."

Having, with the aid of these notes, laid before you all that was thought deserving of notice in the northern portion of the department of New Mexico, I shall again resume the daily journal of occurrences, starting from Santa Fé, and visiting the numerous towns, which will be found laid down on the accompanying map.

October 8.—We now (i. e. *Abert and Peck*) prepared for the regular tour through this *departimento*. At 1 o'clock my men arrived from the grazing grounds with the wagon and mules. I procured the necessary provisions, although some of the commissary's supplies were exhausted, but those I purchased. Colonel Doniphan was preparing to march into the country of the Navajoes, and the battalion of Mormons was daily expected. All the money in Santa

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SAN FELIPPE

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Fé was wanted to equip them; I had, therefore, to apply to Mr. Rich, the suttler, who furnished me with what funds I required. I also procured a few simple medicines from our well known surgeon, Dr. Decamp, and thus furnished, with a party of three men, did Lieutenant Peck and I start to make the survey of New Mexico.

We marched this afternoon but six miles, and then encamped at "Agua Fria;" here we were obliged to purchase fodder and wood. On our road we noticed much of the "Scincio filifoliis," cedar, artemisia, and several species of cacti.

October 9.—As we were in want of meat, we were obliged to purchase of the man from whom we had obtained the fodder. He would not consent to receive less than $1 50 for a sheep; $1 is generally the price throughout Mexico.

After a short march, we reached "Cienega," a very well watered place, as its name denotes; the neighboring hills are full of springs, the waters of clear rivulets are rushing across our path in all directions.

We noticed some large "grullas," blue cranes, in the low grounds, and several flocks of wild geese. This valley is well settled; every minute we saw the pastores, driving their flocks of sheep and goats; we saw, too, the invaluable shepherd dogs, assisting their masters. These dogs are remarkable for their sagacity, and are perfectly skilled in the management of the fold.

We had a very windy day, and the dust flew about in great profusion. After a march of seventeen miles, we encamped on "Galisteo creek." The water is very brackish, and the bed of the stream white with saline efflorescences. The country around shows considerable disturbance; the rocks, which are of sandstone, have an easterly dip of from 20° to 30°, and there are numerous volcanic dikes intersecting each other in various angles.

The Rio Galisteo empties into the Del Norte a short distance north of the Pueblo of Santo Domingo, and five miles to the south of the embouchure of the Rio de Santa Fé. In many places the waters are absorbed by the sandy soil, over which they have to flow; but water is always to be found by following up the bed of the stream.

October 10.—The rock around us consists of sandstone, underlaid by purple and white clays, and below these a dark ferruginous clay.

The *yucca angustafolia* was abundant, and we noticed a new species of stramonium.

The first part of our journey led us down the bed of the creek, and was very sandy; ere long we overtook some ox teams; they had been out four days from Santa Fé, and their oxen had had nothing to eat; already three yoke had fallen down from exhaustion, and had been left on the road. After a journey of 17 miles, we crossed the "Rio Tuerto," and encamped near the village of "San Phillippe." At the time Pike visited this country, there was a wooden bridge of eight arches thrown across the river at St. Phillippe, but it has been entirely swept away, and the people are now obliged to

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wade across. The river runs with great rapidity, and is from three to four feet deep.

Our camp was soon surrounded by Indians. They brought us musk melons, corn, and pumpkins. Their women have a curious habit of stuffing their leggings with wool or cotton. This makes their ancles look very large. We saw large flocks of geese and blue cranes; also some teal.

October 11 —This morning we started up the river for the village of Santo Domingo. After a short march we reached "Cobero," and were most hospitably received by Señor Don José Montejo, who seems to be the proprietor of the whole place. Although he had finished his breakfast, yet he insisted on having another prepared for us. He gave us "los entraños de carnero" and tripe chopped up; also an abundance of "tortillas" and milk that had been salted and boiled. The milk is prepared thus in order to keep it during warm weather from turning sour. One big goblet of water was set in the middle of the table. From this we were all to drink.

I tried to bargain with our host for a mule, but he did not like to take gold in payment, saying "Déme plata blanca."

We now set out for Santo Domingo, passing through unfenced fields of corn and musk melons; we again crossed the river and entered the Pueblo. The houses of this town are built in blocks two stories high. The upper story is narrower than the one below, so that there is a platform or landing along the whole length of the building. To enter, you ascend to this platform by the means of ladders that could be easily removed, and, as there is a parapet wall extending along this platform, these houses could be converted into formidable forts. The front of the upper story is covered with strings of red peppers and long spiral curls of dried melons and pumpkins.

We visited the chapel, and here saw a large wax figure of Santo Domingo. The walls around were covered with oil paintings, some of them the work of excellent artists. Here, too, was a painting of St. Jago, with a long inscription beneath. We noticed on the pannels of the doors singular armorial bearings: one the cross of Santo Domingo, surmounted by a crown; the other a plain cross standing on a globe, two human arms, and these also surmounted by a crown. The Indians who went with us led us through what they called the old chapel. These people, as well as those of St. Philippe, are called Keres or Queres.

Returning, we stopped at Señor Montejos, who gave us one dinner. As his son came in while we were there, I went to him, and, showing my gold, persuaded him to sell me the mule. Some of the pieces were marked 5 *D.*, and others *five dollars*. The first he consented to receive, after I had told him the 5 stood for "cinco" and that D. was for dollars—the American for "pesos." The other he seemed to suspect, for he would not take one of them. Fortunately I had enough that were marked 5 *D*.

Old Montejo offered to sell me a Navajo squaw, who happened to pass as we were bargaining for the mule; and he then related a

PUEBLO DE SANTO DOMINGO.

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long story about the depredations committed by the Navajoes; that they kept all New Mexico poor, whilst they themselves rolled in wealth; "son muy ricos, tienen muchos caballos, muchos carneras, muchos bueyos, muchos! muchos! muchos!"

October 12.—The view from this place, is particularly beautiful; on the farther side of the Rio del Norte, a high "mesa" or table land, stretches down the river; just opposite our camp it is 300 feet in height, and at the very ledge rises an ancient ruin, that from its singular position, excites the speculations of the curious.

This is quite a fertile valley, but there is so little of it, and this little the people cannot enjoy, for fear of the Navajoes, who descend from the mountains, and sweep away the "cabaladas" of the Pueblos and Mexicans, who look on unresistingly. As we descended the river, we noticed that the lower strata of the rocks resembled the saliferous formations on the Rio Cañadian.

We passed through "Algodones," and a mile below, through "Angosturas," and after passing over a distance of eight miles, we reached the mouth o: the "Rio Jemez." Here we got entangled amongst the "acequias," which were then full of water; but some Indians kindly extricated us. We visited "Ranchito," and saw great piles of corn, the best we had yet noticed; then we crossed the Rio del Norte, and ascended the Jemez, passing a curious pillar of volcanic rock, that rises from beds of distinctly stratified clay. These strata are curved, and in many places the volcanic rock has insinuated itself between the layers.

The Jemez valley is very sandy; the bed of the stream three-quarters of a mile in width, contains, in many places, no water, and when it is found, it is of a dark red color. After marching five miles up the Jemez, we reached the Pueblo of "St. Ana." The village was almost enterely deserted, all the inhabitants being engaged at Ranchito, gathering their corn. We had much trouble to get wood for our fires and fodder for our mules; there was no grass to be seen any where in the vicinity.

October 13.—This morning we did not start until quite late, as it required some time to obtain the bearings of the several towns around. Lieutenant Peck deserves the greatest credit for the assiduity he manifested in the performance of his duties; to-day he clambered up to the high "Mesa," that raised its top 300 feet above us, and fixed the positions of Jemez, San Isadore, and Silla. He was accompanied by a Spanish school master, who teaches the children of the Indians in St. Ana. The domine gave us much information with regard the country; he said that there were some gold mines at the head of the Rio Jemez, and told us that the Indians have much ground under cultivation on the tops of these "mesas." To be sure these "mesas" are covered with coating of volcanic rock that forms a good soil, but at such a height, where it is impossible to irrigate, and in this country where it scarcely ever rains, it seems doubtful that much vegetation should be produced.

At length we started to retrace our steps, and gain the Rio del Norte. We soon crossed the river, which was full of wild geese, and passing through "Ranchito," we marched four miles beyond that place when we arrived at "Bernalillo."

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This place exhibits signs of wealth; the houses were larger than any we had yet seen; along the road side were beautiful vineyards, surrounded by high walls of abobes; we rode up to one of them, and looking over, saw some pretty "doncellas" plucking the fruit. They had round flat looking baskets, placed on their heads; these were piled with thick-clustered bunches of the purple grape, from beneath which the bright black eyes of the "doncellas" were sparkling. We could not pass by such a beautiful vineyard, so we stoped and asked for some fruit; some of the maidens, with merry faces, came towards us, when they were suddenly stopped by the gruff voice of a man crying out, that he would himself bring the grapes. We now rode round to the other side of the vineyard; here we saw long rows of vats of ox hides; they looked bloated, as if puffed out with good liquor; in them the grapes are thrown, in order to ferment, after which they are distilled to make the brandy of New Mexico. We bought as many grapes as we wished and then continued our march, until we reached some salt ponds, not far from the town, where we encamped; and here were some large flocks of blue cranes; they kept up a great whooping.

I obtained to-day a specimen of a singular lizard; we saw several large tarantula, and many meadow-larks, flying about amongst the stalks of corn; most of the corn is now being gathered.

October 14.—This morning we took the road lying close to the bluff, and we passed "Sandia," a pueblo, the houses of which are only one story high, but have no entrance except on the roof, where it is sheltered by a curious conical structure, built of adobes. These have an opening on the south side, and one ascends to the azoteas, or roof, by means of ladders. Here we saw some people driving herds of cattle; they were armed with slings, and used them most unmercifully. As the pebbles whizzed through the air, the poor beasts tossed their heads as if in great dread. The sling is mentioned by De Solis, as used by the Aztecs and Tezcucans, in battle.

Our course now led us by the side of a large acequia; this forced us to go some distance from Alemada; at last, we found a place where we could cross, and went directly to that town.

At length we reached a fine vineyard, within three miles of Albuquerque, where we purchased some onions. These vegetables grow to a remarkable size, and form one of the indispensable articles to a Mexican dinner. The adobe walls in the vicinity have the tops covered with cacti, to prevent persons from plundering the vines. We noticed, to day, great quantities of the "myrtina," covered with large pods, now fully ripe.

The ponds by the road side were filled with ducks, geese, and cranes; it was curious to see the last mentioned birds striding along, with out-stretched necks, as they prepared to take flight.

October 15.—This morning I sallied forth, intent upon killing some of the cranes that were gathering together in the corn-fields near our camp. I soon procured a fine large bird, about five feet in height, of which I made a drawing and took the dimensions. Brant (anser bernicla) are very plenty; we got some of them also.

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It is difficult, however, to approach within shooting distance, although they will generally allow one to approach quite close without a gun.

We purchased two sheep from the priest of Albuquerque; he invited us into his house, and gave us some delightful grape brandy. While there, an old Señor from "Padillas" entered the room, with a Spanish version of General Kearny's order for an expedition against the Navajoes. He had with him a long list, including the the names of all the principal people in New Mexico who agreed to furnish men to join Colonel Doniphan's command.

While Lieutenant Peck and I were conversing with the priest, he asked us our names and professions. We told him; and, as soon as he understood that we belonged to the corps of topographical engineers, he said: "Ah! I suppose, then, you know something of astronomy and mathematics?" We replied, "A little;" whereupon he got a piece of paper and pencil, and drew several figures, saying, "este es el cuadro?" yes, that is a square; "este un cerco?" yes, sir; "y este es un triangulo?" yes, that is a triangle. Then throwing up the pencil, and rubbing his hands in great glee, "Ah! voy que vind son astronomos y mathematicos." Thus, we were pronounced by the padre of Albuquerque to be astronomers and mathematicians. Soon after this discussion of the exact sciences, a very handsome lady, who graced the establishment, entered the room, and he presented us to her; saying: "Estos caballeros son astronomos y mathematicos."

We were well pleased with our visit, and did not leave our friend until late; and he endeavored to make our time as agreeable as kindness and politeness were capable of making it.

Begging his permission, we bade him adieu and started down the river. We soon reached the ford, where we crossed the Rio del Norte, and entered the town of "Atrisco." Here we got fast in an "acequia," and were obliged to get a spade and dig down the banks of the canal before we could get the wagon out. This detained us so long that we were forced to encamp, as it was not in our power to reach the Puerco that night.

This evening we saw a very large flock of sheep and goats. The pastores said that there were 4,000 in the flock. At night, the herdsman built a large fire, and, seizing some of the lighted brands, ran around the flock; the sheep frightened, all turned their heads towards the centre, in the direction of the fire, and are not, after such a scare, likely to stray away during the night.

October 16.—We left "Atrisco," and struck boldly off towards the west, intending to reach the "Rio Puerco," hoping the next day to reach "Cibolletta," where I expected to meet Colonel Jackson, and obtain an escort to protect us in the survey west of the Rio del Norte.

At Alberquerque we were cautioned by the people against the dangers we would run before reaching Cibolletta, as the war trail of the Navajoes runs through the valley of the Puerco; and the Mexicans advised us to travel with great circumspection, and not to make any fires at night.

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After marching eight miles, we arrived at a place where the road forked, and taking the plainest, we followed it until it disappeared entirely. It was one of the roads that the inhabitants of Atrisco and Albuquerque travel when they go to get fire-wood. Many roads of this kind, in the neighborhood of Mexican villages, frequently perplex and entangle the traveller.

We now bore due west, and at 4 o'clock reached the "Rio Puerco." After a strict search up and down the river for several miles, we formed our camp near a little pool of water, the only one we could find. The road we came had been very sandy, and our mules were very much distressed by their labor.

The valley of the Puerco is wide and flat, overgrown with varieties of artemisias and coarse grass, fit only for sheep and goats. The banks of the river are of stiff loam; they are 10 or 12 feet high, and stand vertically. The country around is very much broken with sand hills, that are overgrown with cedar trees, the only kind of timber to be seen, except a few cotton-wood trees that are found in the bed of the river. South 15° west, lies a grand mountain, about 35 miles distant; it has two principal peaks, and its present outline greatly resembles that of the Spanish peaks.

October 17.—We soon found that by continuing a northerly course, we were leaving the road to Cibolleta; but as our duties required us to make a survey of the country, more with the object of finding out unknown things than of travelling known routes, we determined to follow up the Puerco far enough to fix its course, carrying on a system of triangulation, by the means of the many high and well characterised peaks that are scattered throughout the country.

We had a very toilsome march; the sand was from 5 to 6 inches deep; in many places our road was obstructed by a dense growth of artemisias; our progress was extremely slow. At length, about 2 o'clock, our mules gave up and we were forced to halt; fortunately we were near a corn field, and I had them fed with the ears and green leaves of the corn. We searched about, hoping to find some dwelling place near; found no signs of any kind, except a narrow path that had not been trod for a long time. The ravens had right of possession, and had eaten much of the corn, and picked all the seeds out of the big pumpkins that were strewed around us.

We now started off to reconnoitre, and found in the bed of the river, where it was completely hidden by the high banks, a conical hut, composed of light poles covered with boughs of trees and mud; also a corral, but no recent signs of their having been used. We crossed the river and ascended a high bluff, noticing remains of buildings on our way, built of flat stones plastered with clay. Ascending the bluff, we found on its highest portion enclosures of stone; one was circular, 3 feet in height and 10 feet in diameter, and an aperture had been left for a door. Another was elliptical, and its walls had been quite high; besides these, there had been many rectangular shaped structures. We were puzzled to conceive for what purposes they had been built. They were more than half

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VIEW OF SOME VOLCANIC PEAKS LOOKING NORTH LAT. 35° 13' LON. 107° 20'.

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a mile from water, and the approach to them on one side was steep and difficult; on the other side impassable, on account of the rocks breaking off with a perpendicular face 180 feet high. These rocks are composed of sandstone, containing shark's teeth, shells, and bones of fish, many of which we collected. We returned, re-crossed the stream, determined to camp here, and to-morrow to follow a little valley that led off to the westward, through which we noticed a faint path. Although the banks of the stream are here 30 feet in height, we yet were so fortunate as to find a place to cross, when we encamped, having found several little pools of water. On the east side of the stream, opposite our camp, we visited a collection of stone ruins; they had been arranged so as to form a square enclosure, whose sides were 200 yards long. Near the town we noticed places of rich black earth, from 2 to 3 feet in depth, that marked the spot where the "corrals" once stood. We afterwards learned that this place was called "Poblazon;" but to all our other questions, with regard to this ancient town, we received the usual Mexican reply of "quien sabe."

October 18.—We arose very early, not knowing but that we should have to march far before we should obtain water. We were at a loss to conceive who could be the owners of the conical hut, and of the cornfields where we staid last night.

Continuing our march westward, we followed the bed of a valley, on each side of which sandstone rocks were piled up, in some places near 600 feet high. These rocks had an anticlinal dip, with reference to the axis of the valley. Our route was strewed with carbonate of lime, in various forms; sometimes beautifully crystalized, at others in amorphous fragments of a waxen appearance. We found, also, fragments of large ammonites, and pieces of inoceramus, and the little knolls around glittered with plates of selenite. This last mineral is very abundant, and we could see it glistening all the day in the sides of the distant mountains. Towards the latter part of the day we entered a volcanic country, our road abounding with fragments of a very hard dark purple and vesicular rock; and to the north of our course, we saw three peaks, or rather columns, of volcanic rock, that seemed to range in a northeasterly direction. They looked so picturesque that I dismounted and made a sketch of them.

We had now been travelling all day, and at length night began to draw on apace; we had not yet found any water, and at last, just as our plight seemed most hopeless, we caught sight of some distant mountains; that, from their course, we concluded must bound a large valley that, without doubt, contained a stream. Soon, too, we caught sight of several columns of smoke ascending vertically; and tracks of cattle, of sheep, and of men, appeared numerous on all sides of us. We now pressed forward, eager to reach a resting place; but suddenly night came upon us, and it was indeed a dark night; we endeavored to follow the path, but were constantly getting off the course; all dismounted and marched along, searching out as well as we could for the path. At last we reached an impassable "arroyo," the banks of which were perpen-

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dicular, and about thirty feet above the stream; the men sprang in and hunted some distance up and down the bed of the "arroyo," but there was no water; we could go no further, and were forced to camp here. As the valley around seemed destitute of grass, we let our mules run free, and tried to make our supper, but you may be sure it was a very dry one. At last we heard the grateful sound of dogs barking, and some of the men came in and said that they had seen lights not far off, so we sent for some water; but the men were absent so long that we could not wait for their return. It was now 10 o'clock; we had been travelling since five this morning without food, without one drop of water, and had marched about twenty-five miles, so that we did not lack appetites. As there was no wood, we gathered some of the dry branches of the artemisia; and, having made a fire, roasted a fore quarter of mutton, which two of us despatched without much difficulty, and then sank down to rest, with the intention of drinking deep draughts in the morning.

October 19.—No sooner did the first rays of light dawn than we started off for the village; all the water the men had brought, they had drunk through the night; as our mules were still loose we could not wait for them to be caught and saddled, but started off on foot; and after a walk of a mile, we entered the village of Moquino. Here we were very well received by one of the inhabitants who gave us some delicious milk, and his wife sat down and made cigarritos for us.

This town is situated on a rocky hill that on one side is perpendicular, and about twenty feet high; the place contains near three hundred and fifty inhabitants.

I had given orders for the wagons to start early, but they did not reach the town until near noon. The mules had run off some distance in search of water and grass; and, in addition, some rascally Mexicans had stolen the ropes from their necks.

As our animals were much jaded by the toilsome marches we had made in the last three days, through the deep sands of the valleys, we concluded it would be best to remain here all day and let them rest.

We had encamped by the side of the Rio Pojuate, close to the town of Moquino, and four miles south of the village of Cibolleta, which is also upon the same river. The country around consists of high masses of sandstone, overspread by a bed of volcanic rock. Near Moquino several huge masses of this rock jut into the sky, and from the valley narrowing up to the foot of these peaks there is a blackish mass of detritus of dark purple rock.

The people of the town pressed around our camp, bringing eggs, milk, and cheese made of goats milk. They seemed scarcely to believe us, when we told them of the road by which we had come; and said it was "un camino diabolo." They asked us if we had not noticed a fresh trail that crossed our route. This recalled to our minds that we had seen such a trail, and our having stopped to examine it. When we told them of it, they said that it was the trace of a war party of fifty Navajoe Indians, who could not,

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MOQUINO.

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according to their accounts, have preceded us more than a few hours. We congratulated ourselves that we had not encountered those Indians. I asked them why the Navajoes did not trouble them. They replied, that they were good friends to the Navajoes.

October 20 —Again we started, leaving our kind friends at Moquino, intending to camp at Laguna. After a short march of three miles, we halted at the town of Pojuate; here we saw several large flocks of sheep and goats. Continuing down the Rio Pojuate, we passed through fields of corn and pumpkins, over which large flocks of cranes were whooping, so that hill and valley rang with the echoes of their cries. After proceeding nine miles, we got upon a fine road that led off in a southwest direction, and six miles farther brought us to the Pueblo of Laguna. We had heard the most romantic accounts of the village of Laguna and the lake in its vicinity; we had heard that this lake was full of water, clear as chrystal, that it was surrounded by small villages, and that the neighboring country smiled in the profusion of the luxuriant productions of this region; that the hill sides were covered with fruitful vines, and the plains loaded with delicious melons: and we were most sadly disappointed. The lake consisted of a little pool, scarce worthy of notice, and the highest cultivated grounds was at the distance of six miles. The houses of this "Pueblo," or Indian villiage, are built of stone and are plastered over with mud, (the number of inhabitants is seven hundred,) they are generally two stories in height, and have ladders by which one ascends to the second floor in order to gain admittance. There is a chapel here, which has the interior painted with curious Indian ornaments, in which they have used the pure red, blue, and yellow. The town is situated on a limestone bluff, that is about thirty feet in height; the country around consists of high masses; a valley runs off towards the north to a distance of thirty miles, in this valley the town of Covero is situated; pretty good place for grass and water; Colonel Jackson's command is at this moment encamped there, but as it would require two days to go there and to return again, we concluded to proceed without any escort, as we had already passed over the most dangerous country that we would have to examine.

On the road we saw many wooden crosses, held firmly in an upright position by heaps of stones piled around their bases. These sacred symbols were not erected by the road side to mark the place of graves or bloody deeds, but to remind the traveller to pray for the soul of the person by whose friends these symbols were erected. The road sides, throughout the province of New Mexico are, in many places, lined with these crosses. Near St. Phillipe, we saw one with a piece of board nailed near the top, on which was the following inscription: "Passer-by, pray for the soul of Doña Maria."

In the evening we were gratified with a visit from some Americans, amongst whom were several old friends. They came from "Covero," and were on their way to Santa Fé.

To-day I killed a beautiful snow-white goose, ("anser hyper-

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boreas;") large flocks of them are found feeding on the bed of the "Rio St. Juan," which river runs close by "Laguna."

The Indians here have numbers of turkeys and chickens. I also saw some tame macaws, that must have come far from the south. The "Pueblos" have a great fancy for taming birds, and in this respect resemble the ancient Aztecas. But they have lost the art of making the beautiful feather embroidery, spoken of by Clavigero, De Solis, and others.

October 21.—Having risen early, and bade adieu to our friends, we set out in a southwestern direction for the town of "Acoma." We were very glad to get away from Laguna, for being encamped near the town, we were surrounded by crowds of children, who, impelled by curiosity, flooded the camp. They did not attempt to steal anything, but they impeded the men in the performance of their duties.

For the first six or seven miles, until we reached some cornfields, we had a broad road before us. The rest of the route was marked by sheep paths. When near "Acoma," we met some Mexicans, with several "burros," laden with peaches, water mellons, and dried fruit, which they were conveying to Colonel Jackson's command at "Covero." They had purchased the fruit of the Pueblos of Acoma, for a mere trifle, and sold the peaches to us for a real the dozen.

We noticed to-day a variety of a yucca, whose leaves are convex on the under side, and concave on the upper, and much broader than the leaves of the Y. angustifolia. On the cedar trees we found a species of mistletoe; it was leafless, and had pink berries that tasted like cedar berries.

We travelled through a level valley, in which we saw many flocks of sheep grazing, attended by Indian pastores and their ever watchful dogs. I tried to purchase some sheep from the people, who were guarding them, but I could not induce them to make any bargain until a chief, attended by some eight or ten Indians, rode up. He appeared to be a wealthy man, and we soon agreed about the purchase. He said that his party were going to Santa Fé; they were armed with bows and arrows, and guns. They reminded me very much of the Comanchees, except that these Indians wear long woollen stockings, of their own manufacture.

We were now quite close to our goal, the ultima thule of our advance towards "el sol poniente." On our right hand, stretching away to the south, is a magnificient "sierra," that raises its summits several thousand feet, where they mingle with the clouds. From the valley in which we journey huge blocks of sandstone rise, the tops of which are horizontal, and the sides of which reach perpendicularly to the height of 300 or 400 feet above the plain. This sandstone is very hard, it breaks in long prisms, whose angles seemed to resist the rounding influence of the weather. This rock exhibits tints of yellow and of light red.

After a journey of 15 miles we arrived at "Acoma." High on a lofty rock of sandstone, such as I have described, sits the city of "Acoma." On the northern side of the rock, the rude boreal

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ACOMA No.1

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blasts have heaped up the sand, so as to form a practical ascent for some distance; the rest of the way is through solid rock. At one place a singular opening, or narrow way, is formed between a huge square tower of rock and the perpendicular face of the cliff. Then the road winds round like a spiral stair way, and the Indians have, in some way, fixed logs of wood in the rock, radiating from a vertical axis, like steps: these afford foothold to man and beast in clambering up.

We were constantly meeting and passing Indians, who had their "burros" laden with peaches. At last we reached the top of the rock, which was nearly level, and contains about 60 acres. Here we saw a large church, and several continuous blocks of buildings, containing 60 or 70 houses in each block, (the wall at the side that faced outwards was unbroken, and had no windows until near the top: the houses were three stories high). In front each story retreated back as it ascended, so as to leave a platform along the whole front of the story: these platforms are guarded by parapet walls about three feet high. In order to gain admittance, you ascend to the second story by means of ladders; the next story is gained by the same means, but to reach the "azotia," or roof, the partition walls on the platform that separates the quarters of different families, have been formed into steps. This makes quite a narrow stair-case, as the walls are not more than one foot in width. Lieutenant Peck and myself ascended to the azoteas, and saw there great quantities of peaches, that had been cut in half and spread out to dry in the sun.

We entered some of the houses, and the people received us with great gladness. They brought out circular baskets, nearly flat, these were filled with a kind of corn bread, or "guayave." It bears a striking resemblance to a hornet's nest; it is of the same color, and is as thin as a wafer. The "guayave" they crumbled up between their fingers, and put into a second basket, from which we ate. Each family occupies those rooms that are situated vertically over each other; the lowest story is used as a store room, in which they put their corn, pumpkins, melons, and other eatables. The fronts of their houses are covered with festoons of bright red peppers, and strings of pumpkins and musk melons, that have been cut into ropes, and twisted into bunches to dry for winter use.

These people appeared to be well provided with all the necessaries and luxuries that New Mexico affords. They are quiet, and seem to be happy and generous. As we walked through the town, we saw them unloading their "burros." Quantities of fine large clingstone peaches were spread out on the ground, as the owners were dividing the loads, so as to carry them up the ladders. And whenever we approached, they would cry out to us, "coma! coma!"—"eat! eat!" and point to the peaches. They generally wear the Navajoe blanket, marked with broad stripes, alternately black and white. Their pantaloons are very wide and bag-like, but are confined at the knee by long woollen stockings, and sometimes buckskin leggins and moccasins. The women stuff their leggins with wool, which makes their ancles look like the legs of an elephant.

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. These people cannot have associated much with the Mexicans, for they scarce know a word of the language. This may be owing to an old Spanish law, referred to by Mr. Murray, the geographer; which law, confined the Indians to their villages, not allowing the whites to visit them, nor were they admitted into any place inhabited by whites. They however seem to possess a smattering of the Roman Catholic religon, their dwellings are often crowned with the symbol of the cross; and, as I have already mentioned, one of the first objects that strikes the eye is a large chapel with its towers and bells.

We now returned to our camp in the valley below; although we had ridden up, yet we did not feel inclined to run the risk of descending the spiral stairway, on other feet than those of our propria persona.

At one place, just after passing the narrow defile, near the tower rock, a wall has been raised by the Indians to prevent accidents from persons falling over the precipice. I took a sketch of this portion of the ascent.

When we reached the plain we saw large flocks of sheep, herds of cattle, and droves of horses. We had encamped by the side of some holes that the Indians had dug; these, they said, yielded a constant supply of water; and between our camp and the city, there was some water that ran along over the bed of a stream for a few yards, when it disappeared beneath the sand. This furnished the inhabitants with drinking water; I was obliged to scoop a hollow in the sand before I could get my tin cup full. This running water is three-fourths of a mile from the foot of the rock.

To look from our camp upon this town, as it sits on the flat top of the rock, which rises so abruptly from the plain, and catch sight of the little windows, surrounded with white washed squares, one is struck with the resemblance of the buildings to a fort. The mind recalls the images it has formed of those fortresses that were observed by the army of Cortez; such as the village of "Capistlan," in the mountains of Guastepeque, described by Solis, as "a town strong by nature, seated on the top of a great rock, difficult of access, the way so steep that the Spaniards could not use their hands for fear of their feet slipping." In a second place, he describes the attack of another fortress: "a considerable fortress, on the highest eminence," in the same mountain, thus: "the Indians feigned to be in some disorder, that they might entice the Spaniards to the most dangerous part of the precipice; which they had no sooner effected, than they returned with most horrible cries, letting fall from the top such a shower of stones, and entire rocks, as barred up the way, after having borne down every thing it met with." Bernal Diaz, the doughty captain, is obliged to retire to a hollow rock, and advise the rest to halt and leave the paths, it being impossible to go on without falling into danger.*

* And Cortez himself, the great general, seeing that there was no continuing the attack that way, and fearing all would have perished, sent them orders immediately to retire, which they did with the same danger.

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ACOMA No. 3.

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In the evening, at a quarter past ten o'clock, a meteor of dazzling splendor dashed across the sky; its path was perpendicular to the horizon, and passed through the head of the constellation draco; the brightness was such as to eclipse the light of the candle by which I was writing; five minutes afterwards I heard a report like that of a distant cannon.

October 22.—We now turned our faces eastward, as Acoma is the most western of the New Mexican towns. Zuñi, which, in a direct line, is said to be but 80 miles to the west, is situated on the tributary waters of the "Rio Gila."

Our mules had wandered off a great distance, and, owing to the difficulty of catching them, we did not leave Acoma until 10 o'clock. We then started for "Rito," a Spanish town. I remained behind some time, in order to sketch one of the passes to the town of Acoma. This one only is practical for foot passengers. There are, besides, two others, one of which can be passed on horseback, but the principal one is that by which we went up yesterday.

Our course, for the first two miles, led us off in a southeastern direction. In this short distance we descended rapidly, and having gotten safely over a dangerous road, we found ourselves much lower than we were yesterday. We had reached a second level, below that of the light red sandstone of Acoma. The high escarpments between which we passed, presented fine views of the superposition of the different strata. Uppermost is the hard and compact sandstone, such as forms the rock of Acoma; then comes a hard whitish clay; then a dark sandstone, of a red color; and finally, a reddish brown, ferruginous, and sandy clay.

We now travelled northeast, and parallel to our route from Laguna to Acoma; and although not more than four or five miles distant from our course of the preceding day, yet the country presents a new aspect. Having reached this second mesa, and being forced by our route to travel close to the foot of a high escarpment, we could not see over it, and therefore could not discover any of the points we had already noticed. Several times the trail we were following gave out; at last, quite late, we struck a fresh trace of a carreta. We followed this trace until night closed upon us. There was no moon, and dark clouds dimmed the stars; we all dismounted, and in silence endeavored to keep upon the path. Aided by frequent flashes of lightning, we kept the track, and urged on our jaded animals, hoping soon to reach a stream. At length our wagon arrived at a slight sandy acclivity, where the mules, worn out by the difficulties of the road, completely broke down. Here we encamped; on a sand knoll we pitched our tent, and then sent out one of the men in search of water, for we had not seen one drop since we left our morning's camp. We now lit a cheerful fire of artemisias, and then sat down to a supper of delicious ribs of roasted mutton, such as is only found in the mountain region of New Mexico. We were hardly comfortably seated, when a terrible squall of wind arose, accompanied by a slight rain. In the midst of the squall our tent blew over, and we were obliged to refix it several times. We luckily had some extra mule pickets that

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were not in use; they were very long, and by their means we succeeded in erecting a second shelter; but everything was covered with sand, and we felt far from comfortable.

In a short time, the man we had sent out returned unsuccessful; so we finished our suppers without coffee, without even a cup of water. The poor mules, that had worked so hard all day, we were obliged to fasten to the wagon; here they remaimed all night, on the barren sand, where not one blade of grass was to be seen. We dared not let our mules loose, knowing that when urged by thirst, they will wander off until they find water.

October 23.—We arose when the first streak of grey light appeared in the east, and, without stopping to prepare our breakfast, we resumed our toilsome march. The poor starved and thirsty mules plodded pokingly along, in rather a doleful plight.

Before proceeding far, I caught sight of the peaks of volcanic rock that tower above the town of "Moquino." Immediately after, we got a glimpse of a distant pool of water glimmering in the sunlight. I directly ordered the command to proceed to the pool and to encamp, while I rode over to speak to some pastores who were watching their flocks close by. From them I learned that the ruins we saw near the water were all that now remained of the town of "Rito," which town they said had been deserted by its inhabitants some years since, because those people who lived higher up on the "arroyo de Rito" cut off all the water of the creek in seasons when they wanted to irrigate their lands, thus depriving the people of Rito of it, who needed it most at the same season, for the same purposes.

We encamped close by the town; the large pine rafters of the deserted houses furnished us with fuel. In the afternoon we visited the town. The houses were all of them built of stone, covered with mud, and neatly whitewashed. Here we found a neat little chapel, and the house of the priest still remained in pretty good condition. One feels sorrowful to see so much labor thrown away, so much useful material left to the ravages of destructive time; but our fires burned so cheerfully, that all regrets were consumed in the lively flames. We concluded that it would be a fortunate occurrence to daily encounter old ruins. We remained here all day. We had plenty of wood and of water; the pasturage was good, and our mules needed time to rest and recruit their strength.

In the afternoon, we saw some commissary wagons returning from Covero to Albuquerque. We sent over to them, in order to ascertain if they had any letters for us; for we had desired to have all our letters forwarded from Santa Fé as soon as they arrived there, as those travelling through the country could easily find our whereabouts on enquiry.

Towards dark a party of five or six Mexicans halted near us, and soon more of the rafters from the old ruins were crackling in the flames. These men said that they were going to fight the Navajoes, and that many more of their "compadres" were already on the way.

October 24.—At eight o'clock, we left the ruins of Rito, and

NEAR RITO

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crossed the "Arroyo de Rito," it is from four to five feet wide, and three inches deep; it has a sandy bed, nearly twenty yards wide, that is evidently covered with water at certain seasons of the year, The valley along which our road runs is seven miles wide, and is covered with good grass.

As we continued our journey, we had on our left a ragged toothed sierra, which the distance mellowed to the same tint with the sky. Close to us rose a high mesa of dark red sandstone, that was based on the compact whitish clay; and wherever we could catch a glimpse of the strata above, we found it to present a greyish white hue; and when we reached it, that it was composed of clay and sand. The first eight miles of the road was compact and firm; at its termination a wild looking cañon extended into the mountain. Here water can be got, but the path is so strewed with huge fragments of rock, that constantly block the way, as to prevent the watering animals there. The first portion of our road was strewed with pieces of petrified wood, full of silicious particles, which glistened in the sunlight.

On one side of the road, we found some wagon-wheel spokes, we collected them with great care, intending to manufacture them into pins for our tents, and pickets for the mules. Hard wood cannot be obtained in the whole of New Mexico. The country around us seems to produce no wood except the cedar. Among the plants we noticed the yucca angustifola, and several varieties of the artemisia.

After a journey of twenty miles, we encamped on the "Rio Puerco," about nine miles above the point at which it receives the waters of the "Arroya de Rito," or as it often called "El Rio de San José."

The provision wagons had arrived here only a little time before; one of the teamsters had gone down the river in search of water, so some of us went up the river, and at a distance of two or three miles found some water, that was quite thick with mud. This we collected and put by, to allow the mud time to precipitate. We had brought with us enough water for our immediate wants, so we determined to let the muddy water rest until the next morning.

On looking at the map, the Rio Puerco appears to be quite a formidable stream. A river 140 miles long, with a valley of seven or eight miles wide, through which it flows, would lead one to think that here was a fine country for pasturage, and a plenty of water. Not so, for we are now but forty-eight miles above its mouth, and there is no water; and the valley, deep with sand, only nourishes artemisias, yucca, and cacti. The banks of the Rio Puerco are perpendicular, and often twenty to thirty feet high; showing that, at some seasons, great bodies of water must rush along its bed.

The men with the ox-team said that their oxen would not be able to get over the top of the dividing ridge between us and the Rio del Norte, unless they travelled on now, for want of water so soon destroys the strength of oxen. They therefore bade us adieu.

October 25.—When we arose this morning, we found the ground covered with a heavy frost, and there was a skim of ice on the water we had put aside to settle. Indeed we felt quite

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numbed with the cold, but a cheerful fire soon restored the genial circulation of the blood.

We soon started, and, before proceeding far, overtook the wagons; they had not been able to reach the dividing ridge, on account of the exhausted state of the oxen. As this ridge was but 5 miles from the "Puerco," we soon attained it, and once more caught sight of the Rio del Norte, and the grand chain of mountains on the farther side of the river. Far away to the south, we saw this magnificent stream winding along, its apparent continuity broken by its meanders and its islands, so that it looked like a chain of silver lakes.

On the ridge, we collected enough wood to last a couple of days, for no wood is to be obtained within less than 9 or 10 miles of Albuquerque, where we should stay a couple of days, as it was absolutely necessary that our mules should have some rest. We had travelled at the average rate of 15 miles a day; thrice we had been without a drop of water after a long day's journey, as at Moquino, at Rito, and at the Rio Puerco. Although some of the road was excellent, such as from Cibolleta to Laguna, yet, for the greater portion of our route, we had travelled through deep sands, without a road; through rude wilds, without any guide.

As we entered the valley of the Rio del Norte, we met *Major* Edmonson, with his command, on their way for the Navajoe country. Most all of his teams had broken down, and he was obliged to stop at the "Rancho de Atrisco," in order to recruit them.

We heard, to-day, some rumors of General Taylor's battle at Monterey. These rumors came up by the way of Chihuahua. They state the loss of the Americans at 300, while that of the Mexicans was 1,200. As the report came through Mexicans, we judged the result must be even more favorable to our arms than these rumors represented.

October 26.—This morning we received notices of an incursion of the Navajoes, a few miles below us. The pastores left their flocks and fled, while a large body of Indians, rushing down from the mountains, where they had secreted themselves during the night, devastated the whole valley, killing all the human kind they met, and sweeping off the flocks and herds of the Mexicans. No less than 5,000 sheep were carried off within 20 miles of the great city of Albuquerque.

In the afternoon, we went to pay our respects to the padre; he received us most kindly, although seated at the dinner table. He insisted upon our entering, and then introduced us to his friends as the mathematicians and astronomers. I am under great obligations to him for changing some gold for me. Mexicans in general do not like to receive anything but "plata blanca."

We heard this evening that the American traders were cut off from all intercourse with Santa Fé, by a body of Mexicans who had come up from "El Passo." Captain Burgwin and Captain Grier marched down this morning, in order to assist the traders.

October 27.—We did not get off this morning until 10 o'clock.

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One day's rest always causes such a break in the regular chain of previous habits as is difficult to repair.

When we crossed the Rio del Norte, I met Lieutenant Noble, of the 2d dragoons; he confirmed the reports that Captain Burgwin and Captain Grier had gone down the river to assist the American traders, who were threatened with an attack by a body of Mexicans from El Passo. We also heard that Mr. James McGoffin had been captured, and taken as a prisoner to Chihuahua.

Continuing our journey down the east side of the Rio del Norte, we soon arrived opposite the town of "Pajarito." Here the little "Rio San Antonio," which takes its name from the town near its source, yields up its waters to the grand river of Mexico.

As I attempted to cross the "Rio San Antonio" my mule sank in a treacherous quicksand so suddenly that I could not throw myself out of the saddle before she was half covered. I managed to scramble to the bank, from wnence I started, while the mule, relieved of my weight, struggled to the opposite side of the stream, which she reached in safety.

After a march of 11 miles, without seeing a single town on the east side of the river, we recrossed the Rio del Norte, and encamped at "Padillas." This town is near the foot of a high mound, and is wholly Mexican. While travelling about New Mexico I tried several times to gain information with reference to the population of the towns, the numbers of the flocks and herds owned by the inhabitants. I have asked how much corn and how much wheat the land yields to the "fenegada," but never obtained other than the reply of "quien sabe." I would therefore have been obliged to content myself with rude approximations as to the number of inhabitants, had I not fortunately been enabled to get hold of a document from the State department at Santa Fé, which, coming in an official form, is likely to present a correct statement. It is so intimately connected with my report that I will at once introduce it.

Extract from the records in the State Department at Santa Fé.

[Translation.]

Mariano Martinez de Lejanza, brevet brigadier general and constitutional governor of the department of New Mexico, to its inhabitants sends greeting, that the assembly of the departmet has agieed to decree the following:

The assembly of the department of New Mexico, in discharging the powers which are conceded by the 134th article of the organic law of the republic, decrees the following:

Division of the department.

Art. 1. The department of New Mexico, conformably to the 4th article of the constitution, is hereby divided into three districts, which shall be called the Central, the North, and the Southeast.

skirt of a large round grove of cotton-wood trees. There were several flour-mills near, and the houses are well built; that of Señor Otero is as fine as any in the department of New Mexico.

At Peralta we met with two very polite and communicative gentlemen; they freely answered our interrogatories, and kindly furnished us with some pamphlets and several copies of the "Republicano," a paper published in the city of Mexico. Three miles to the south, is the village of "Valencia," the capital of the county of the same name. Directly opposite to use, on the west side of the river, is the town of "Lentes," and one and a half miles south of it, the town of "Lunes." We now returned to "Padillas," and on our way stopped at "Isletta;" we entered some of the houses of the Indians, who had numbers of buffalo robes, which they offered to trade. They had also apples and bunches of grapes—the latter fruit they hang up on the rafters, where it does not decay as it would do in the United States. In fact so pure is the air, and so free from all tainting influences, that meat may be hung up in the same way, at any season, without fear of being spoiled. One of the favorite dishes of the Mexicans consists of meat that has been dried by simply hanging it over cords that are stretched beneath the "portales" of the house for this purpose. The Indians also preserve their melons for some time, plucking them before they are entirely ripe, and suspending them by twine manufactured from fibres of the yucca or palmillo.

In good season we reached "Padillas," when I at once called to see Señor Don José Chavez, to inquire of him when I could procure a guide, when he kindly promised to send me one of his peones on the coming morning.

October 30.—We again crossed the river, and then continued onwards, in a course almost due east, for the mighty range of the Sierra Blanca. The first three miles was up a sandy acclivity, which gave our wagon mules some severe labor; but, having at last reached the top of the ascent, we found a fine compact road, over a plain composed of clay and gravel. For the first twelve miles the road continued its direct course; at length we began to approach "el cañon infierno," when our road leads us over beds of limestone. This was full of little patches of hornstone, which were varied with cracks that were now filled with calcareous matter, so that the patches resembled ludus helmontii, or septaria.

The road, on both sides, was thickly studded with several species of yucca and cacti. The mountains were covered with snow, and we soon began to feel a great difference in the temperature of the air as we proceeded.

Having marched sixteen miles, we entered the "cañon infierno;" there was a clear stream of cold water, which, as we followed up to its source, we found to be, in many places, entirely absorbed by the sand. Along its bed grew many cottonwood trees and grapevines; they both show the effects of the late frosts; the brilliant yellow of their leaves forms strong contrast with the sombre green

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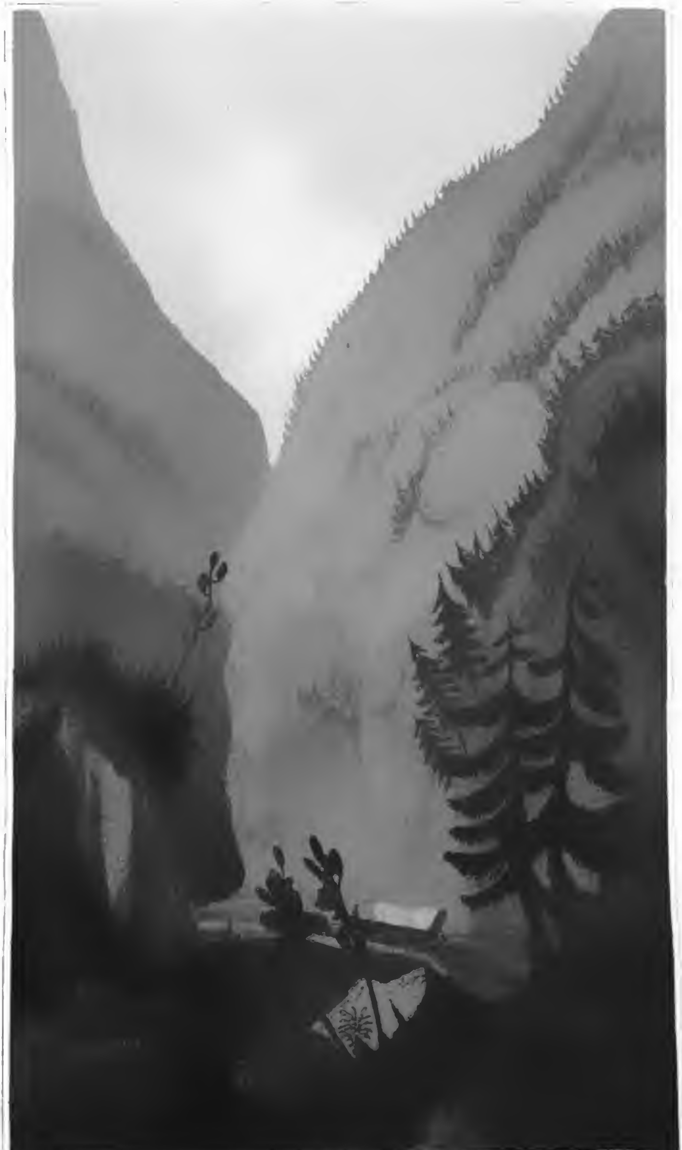

EL CAÑON INFIERNO.

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of the cedar and piñon, with which the banks of the stream are embroidered.

Stupendous masses of green stone that were once seething in the bowels of the earth are piled up, rock upon rock, until but a narrow strip of sky can be seen over head. These rocks are traversed, in all directions, by narrow seams of milky quartz. Various species of cacti and yucca spring forth from every crevice where enough earth has collected to afford them nourishment, and the cedar and piñon stretch out their boughs above these plants, as if to prevent the sun from evaporating the little moisture they contain.

We encamped, after having proceeded five miles into the very heart of the cañon; here the rocks were so steep that not one spot could be found where we might pasture our mules; we, therefore, cut down boughs of cedar, but the animals only nibbed them a little, and we were forced to tie them fast to the wagons to prevent their going off in search of pasturage.

October 31.—Last night we had a terrible storm; it consisted of a succession of great gusts of wind, accompanied by rain, hail, and snow; the wind roared through the cedars on the mountain side, with the sound of a grand water fall. Our tent trembled beneath the terrific force of the blast that swept backwards and forwards through the cañon, and the deep gorge sent forth fierce howlings.

Morning at length dawned, and we arose shivering with cold, and gathered around the fire. Our Mexican guide had been obliged to walk about all night, in order to keep warm, for the fire went out during the early part of the night. Our mules had had nothing to eat, we, therefore, hurried off quickly, hoping before long to reach a patch of grass, where we could halt. We soon met with some of Señor Chavez's wagons, which had been sent out to procure pine logs fit to make rafters for some new buildings.

Mixed with the cedar and the fir tree, we saw some stunted oaks, "Q. olivæ formis;" also some fine specimens of the pitch-pine. Amongst the shrubs, there is a species of holly; it bears scarlet berries, on which the robbins, flickers, and stellar jays feed with great delight. We noticed numerous signs of the bear, and our guide said that they were of the black bear.

As the road was rough, we had to be careful lest the wagon should upset. Before we had gone ten miles we reached a level piece of ground; here we halted and built a large fire, around which we gathered, while the mules were busily engaged in appeasing their hunger.

After halting an hour we resumed our march, and found the country more gentle in its aspect, and much easier to travel. We now commenced descending slowly, for we had crossed the dividing ridge; the ground was in many places covered with snow, except where it was exposed to the rays of the sun. The air was biting cold. At length we entered the road that runs from Albuquerque to the famed "salinas," or salt lakes. These lakes afford salt for the whole of this region. Our course was very direct, and as the

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chill winds came rushing along to meet us, we found ourselves exposed to their full sweep, and we experienced the cold of a midwinter day.

Near three o'clock we formed our camp in the densest grove of pine trees that we could find. Having turned our hungry animals loose to graze, we made a huge fire of pitch pine, and the rezinous wood soon gave forth fierce flames and genial warmth. We had marched 15 miles—cold and fatigue had well prepared us to enjoy such a fire as we built. Before long, a number of Mexicans, with eleven "carretas" loaded with corn, stopped and encamped, not further from us than a stone's throw. We went to see if they had any vegetables to sell, and learned that they were from "Tagique," and were going to "Albuquerque." They offered us some dried pumpkins, for which they asked a most extravagant price. These Mexicans work for three reals a day, (37½ cents,) and yet will often insist on having that price for a single stick of fire-wood, which they obtain for the cutting, and which can be cut in a few minutes. Although the Mexicans seem to be so desirous of obtaining money, yet they do not know its true value or use. We often heard of men of the highest class, whose single desire seemed to be to collect gold and silver and stow it away. The major portion of the people live not one bit better than the negroes on a plantation in our southern States; and the rico of the village, like the planter, possesses everything; no one else owns a single sheep.

I have been much surprised by the many men and children of the lower class that I have met with who both read and write; in fact, all that we questioned seemed to be educated, thus far, but they have no books; I only recollect to have seen a Roman Catholic catechism at Padillas. Many of the sons of the ricos are well educated; we saw several who had been at Union College, St. Louis. They speak French and English, and understand their own language grammatically.

November 1.—We found this day much more pleasant than the preceding one, and soon resumed our march, our course still direct, when at once, before we had gone more than four miles, we caught sight of the extended plain, which may be considered as unbroken from this place on to the land where the timber grows. To look upon this boundless extent of prairie, fills the mind with ideas, not of beauty, but of grandeur; and when, with the mind's eye, we travel still further over successions of these boundless plains, one is seized with a feeling allied to pain, as the mind expands to comprehend such vastness. Such were the impressions of the scene before us; and when we looked back, we saw the hoary heads of the lofty and snow-capped mountains, to mid-height clad with sombre cedars, while round their base, and near to us, the rugged rocks were piled, as if the wild disorder in which nature had first thrown them had been anew confused by subterranean convulsions.

The bearing of the "Lagunas Saladas," is S. 62° E., which is the same with the general bearing of the Albuquerque road since we first struck it. A slight ridge that rises beyond these lakes forms the dividing ridge between the interior basin in which they

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are situated and the valley of the Rio Pecos. Two miles further brought us to the deserted village of "Chilili;" from this place the road continues on in the course to the salt lakes, which are 15 miles distant. The town of Chilili is one of modern construction; the walls of the houses are formed by placing logs upright in the ground, and plastering them over with mud. The roofs of the houses are flat, and composed of the same materials. The town was deserted some years ago, on account of the disappearance of the stream of water that supplied the place. Part of the inhabitants have formed a new town higher up on the course of this fickle stream. We therefore started for this second town. Having gone a couple of miles we found the village, which is one of the poorest we have seen. Crossing the stream, which is here full of water, we reached the road that runs from Old Chilili to Tagique; the two places being about 16 miles distant from each other. We soon encountered flocks of sheep containing several thousand; we stopped to purchase some, and found them to be remarkably fat. The grazing grounds to the east of the mountains afford excellent pasturage; and this basin, around the salt lakes as well as the valley of the Pecos, are deservedly celebrated.

While making my selections from the flock of sheep, Lieutenant Peck, who had ridden on a short distance, encountered two Mexicans; no sooner did they see him, than they dismounted, and commenced examining the loading of their carbines. Lieutenant Peck immediately drew forth the pistols from his holsters, whereupon the men held a council of war, and concluded to cry out "Amigos!" and then advanced, saying that they had mistaken him for a Navajoe.

At last we reached "Tagique," and hunting below the town without finding any water, we were forced to encamp higher up on the stream, where we found an abundant supply. Our march, since starting, was 22 miles.

At this town we met Mr. E. J. Vaughan, a Missourian. He had, he said, been extremely anxious as to his safety in remaining here, for an insurrectionary feeling was rife through the whole country, and particularly at this out-of-the-way place; and this feeling was not a little excited by messages from persons in Chihuahua, stating that they were about to come up by this road, with 11,000 men, and with the assistance of the New Mexicans would destroy all the detestable heretics. And he accidentally heard some of the inhabitants of this town arranging the partition they would make of his goods; for he was here trading with the people for corn, and the wagons we saw yesterday were some that he had sent on to Santa Fé. Mr. Vaughan said that he had spent thirteen years in this country. He gave me some interesting accounts of the customs of the Puebloes, and tells me that they have a dance, called Montezuma's dance, which is danced around a pole. He also stated that when he first came to this country that the ruins of Pecos were inhabited, and that he had been there and seen the sacred fire.

November 2.—As we learned that the next town was but three miles distant, we did not leave this place until quite late, and in

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the meantime had sufficient leisure to examine the ruins near Tagique, part of which are at present covered by the town. We noticed mounds from 6 to 7 feet high, running due north and south, east and west—an arrangement peculiar to all Indian towns, and which seems to be pretty generally adopted by the Mexicans. We picked up some pieces of adobe that looked as if they had been burned by fire. At one place the mounds indicated a building of considerable size; this we took to have been a place of worship, and afterwards learned that the Mexicans called it the church.

As we drew close to the present town, we noticed some people digging earth to make adobes; they had exhumed a wall, consisting of adobes, with a surface of 18 by 19 inches, and a thickness of 2 inches. As we pursued our examinations, we found these mounds divided by walls, into chambers not more than 5 feet square. These could not have served for sleeping rooms, as no one could stretch out comfortably; we therefore concluded that they must have been the lower stories of buildings, such as those of Taos, Santa Domingo, and Acoma; and the great mass of debris around these walls, shows that these buildings were once several stories high. We saw pieces of pottery, similar to that now used at the various Pueblos; also arrow heads of milky quartz, which bear the same proportion to the diameter of the arrow in present use, as is here represented.

The people who were digging said that they sometimes found "metates;" these are the stones called "metlatl," by the Aztecas, on which the Indians put their corn, in order to grind it. One is not likely to observe these mounds unless they are pointed out.

Bidding farewell to our friends, we started off, and after a march of 3 miles, in a southwestern direction, we encamped at the village of "Torreon," a place containing not more than 20 houses, formed in the same manner as those at old Chilili. Here we found a fine large stream, that bursts forth at once from a grand spring in the side of the ravine above the town. As we approached, some ducks started up from the clear water; they were the teal and mallard. In the afternoon, we went to visit the town, and there saw the looms with which the Mexicans manufacture their tilmas, or blankets—the "tilmatli" of the Aztecas.* These looms are similar to those one meets with in the United States, except in the construction, which is of the rudest kind.

In the evening, some of the town folks came to make us a visit; they appeared to be a very gay-hearted set, and we had quite a

*See Clavigero.

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merry talk, and a smoke; for men and women are always provided with the cornhusk, or shuck, and tobacco to make their cigarritos.

November 3.—Having purchased some corn at Tagique, with which we commenced feeding our mules, they seem to be less inclined to wander away, and no time is now lost in catching them. We were, therefore, off betimes in the morning, although we again had but a short march, for the distance from "Torreon" to "Manzano" does not exceed 8 miles.

On the road side, we noticed a great deal of the same species of holly that we had seen in the "cañon infierno." We also saw the "piñon," and the varieties of cedar; one of which our Spanish guide called "cedro," and the other "savino."

To the east, and about 17 miles distant, there are several small lakes, into which the streams in this vicinity empty their tribute. These lakes have no outlet, being situated in the bottom of a basin, 25 miles in width, and 50 miles in length.

We caught sight of "Manzano" when but midway between it and our morning's camp. It is one of the largest towns that we have met with on the west side of the river. Many of the houses have their fronts neatly whitewashed, and the church has its whole façade whitewashed with a preparation of calcined selenite. This mineral is often used as a substitute for glass in window sashes.

When we first neared the town, several of the inhabitants came out to meet us with guns in their hands. The people still have a lingering inclination for the old government, and although none of their institutions have been changed, yet it will be some time before they will regard the entrance of Americans otherwise than as an intrusion.

We encamped close to an "acequia" that feeds the mills of the town, after passing through the most central streets of the place.

Near our camp there was a large grove of apple trees; and on the east side of the town, near the mountains, a second grove. The trees are planted very close together. These groves give the name to the town of "Manzano."

In the afternoon, we visited the town and its environs. On the side towards the mountains, there is a large dam, constructed of crib-work, 12 feet wide, and 8 feet high, and 100 feet long, formed of rough logs, and the interior is filled up with stones and earth. Just now the lake is nearly dried up, and the little mills that its waters used to turn have not sufficient power to grind the miller's corn. These mills, like everything else in New Mexico, are of very primitive style. There is a vertical axis, on the lower end of which is the water-wheel; the other end passes through the lower burr, and is firmly connected with the upper stone, which, as the axis turns, revolves upon the lower stone. Above all this, hangs a large hopper of ox-hide, kept open at the top by a square frame, and narrowed off towards the bottom, so as to present the form of an inverted cone. In the extremity of the bag is a small opening, and this is fastened to a little through. One end of this trough being supported by its connexion with the hopper, the other end, or mouth, is sustained by a horizontal strip of wood, of which an

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extremity rests on an upright, and the other is upheld by an inclined stick that rests on the upper burr, so that the motion of the burr gives a jostling motion to the trough and hopper; thus the grain falls into the opening in the centre of the upper burr, and passes out between the two burrs.

In the evening, the alcalde came and invited us to a fandango.

Whilst sketching some of the buildings in the towns, a large concourse of the inhabitants collected around me, eager to see what I was doing. I took the opportunity to impress them with the idea of the numerous bodies of Americans who were in the country. I told them that large bodies of soldiers were to be stationed at Albuquerque, this winter; that there were troops at Covero, that there were troops in the Navajoe country, and troops at Santa Fé. And as to the Mexicans having said that they were coming from Chihuahua, by this route, to Santa Fé, that they lied; the people of Chihuahua talked of what they would do, while the Americans have already gone down the river to meet them, if they dare come. These things they knew to be true, for they all are well acquainted with the motives and disposition of our forces. From that moment there was a great change in the conduct of the people.

In the evening I went to the fandango, and met with a merry and happy-hearted set. They all danced, and scarce a moment during the evening but what the floor was occupied with couples whirling in the graceful waltz. They danced the "cumbe," they waltzed, and danced again. The alcalde and his wife sat at the head of the room; she had a black bottle full of "aguardiente," this she dealt to the most honored; and a peasant went round the room selling apples. The music was produced by guitars, violins, and voices. The singers composed their songs impromptu; and often the listeners would burst forth into lengthened peals of laughter, at some happy stroke of the witty improvisator.

While here, I made the acquaintance of "El Señor Don Pedro Baca," one who has charge of the silver mines. He told me that there is, in the mountains, mines of silver, copper, iron, and "azogue;" by this last word, I understood him to mean quicksilver; but in strict mining language, "azogue" is used to mean silver ore adapted for amalgamation; for the ores that I brought to the United States, and which he called "azogue," do not contain any mercury.

Upon my expressing a desire to obtain some of the ores, he said that he would send at once; it was now near 10 o'clock at night, and I begged him not to think of putting himself to so much trouble; but he insisted on sending, and told me that if I would wait until 12 o'clock the next day, that his men would return with plenty of specimens of the ore. As I still insisted on his not going to such great inconvenience, he said that he was obliged to send out, and whether I waited or not he should do so. I therefore consented to remain.

November 4.—As I should be detained here until midday, I sent forward the wagon and party, and went with El Señor Don Pedro, to his house, there to await the arrival of the messenger with the

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specimens. He gave me a book containing the laws of the mines, and spoke much of the productiveness of the "labores" of Manzano, which he represented as greatly superior to those of Socorro, as he had once worked those of the latter place. This man was the wonder of the village; he had been to Matamoras and to New Orleans; and while I was there, took the opportunity to give a long account to his friends of the great steamboats on water, and the little steamboats on land, that run along on roads of iron; and concluded his discourse by saying, "what in the whole world shows more beautifully the wonderful genius of man than steamboats and steam cars?" The rest of the time was consumed in looking over some plants; he pointed out a species of wild marjorem, that he called "Oregon."

At 11½ o'clock, the man that was sent returned, bringing numerous specimens of silver ore. He said that he could have got me specimens of the copper, and other silver ores, but the mines were too far for him to go and return by 12 o'clock. My friend called the quartz "quixa;" also "madre de la plata."

I now bade adieu to my generous entertainers, and with thousands of extravagant compliments from the kind people, I set out to overtake the party. After travelling southeast for 6 miles, I reached the ancient village of "Quarra." Here there is yet standing the walls of a time-worn cathedral; it is composed entirely of stone, red sandstone; the pieces are not more than 2 inches thick. The walls are 2 feet wide, and the outer face dressed off to a perfectly plain surface. The ground plan presents the form of a cross, with rectangular projections in each of the angles. The short arm of the cross is 33 feet 2 inches wide; the long arm is 18 feet 9 inches wide; their axis are, respectively, 50 feet long, and 112 feet long, and their intersection is 30 feet from the head of the cross. The rectangular projections that partly fill the angles formed by the arms, are 6 feet square. At the foot of the cross are rectangular projections, that measure 10 feet in the direction of the long axis, and 6 feet in the other direction. Around the church are the less conspicuous remains of numerous houses, that had been built of the same material, and the surfaces of the walls finished with tools; but these houses are almost level with the earth, while the walls of the ancient church rises to the height of 60 feet. While making my measurements, assisted by one of the men who had remained with me, a Mexican came up to me and said in the most mysterious way, "I know something of great moment, and want to speak to you, to you alone; no one must be near; come with me to my house." I went; but when we arrived there, we found an old ruin fitted up with such modern addition as was necessary to render it habitable. Here were several women. I sat some time, talking of indifferent matters, waiting anxiously the important secret; but my friend did not like the presence of the women, and would not tell me then; so I got ready to recommence my journey, while he endeavored, in a thousand ways, to detain me. I asked him some questions about the geography of the country, and about the famous place called "Gran Quivera."

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He told me that it was exactly like the buildings of Quarra, thus confirming what I had learned at Manzano.

I now signified my determination to proceed, when this man seemed extremely anxious about my going, and at last told me that he would meet me in a cedar grove, some distance in my route. In a little while I reached the grove, and saw him there. He then told me that he had discovered the greatest mine in the country, where there was an abundance of gold and silver. I asked him why he did not go and get it? "Oh," said he, "you cannot have been long in this country not to know that we poor people can keep nothing; the Ricos would seize all, but with your protection I would be secured in my labors." Then, he added, "I'll give you my name, write it down, it is José Lucero, of Quarro; you can inquire in the villages through which you pass, they will there tell you I am honest." I took down José Lucero's name, and proceeded on in my journey, so that if any one wishes, they yet can go and seek the gold of Quarra.

Having journeyed some distance beyond this place, we suddenly heard the most horrible screechings and groans, as if one was approaching the portals of Erebus; and all these horrid sounds proceeded from the never greased wheels of some Spanish "carretas" These curious structures are formed of pine, chiefly; the axle is of pine, and the wheels of cotton-wood; they are made thus: A rectangular piece of wood, about four feet long, two and a half feet wide, and one foot thick, is procured; this is diminished in thickness, so as to leave a projection on each side, which forms the hub, and its extremities are rounded. The remaining arcs of a circle, of four feet, are fastened to the first piece, with large wooden pins, so as to complete the circumference of the wheel. A large hole is pierced in the vicinity of the centre, to receive the spindle of a huge pine axle; a body like a hay crate, and a tongue, complete the "carreta." The oxen are attached by the means of a bar of wood, that is lashed to their horns. We met five of these "carretas," they were on their way to the great "Laguna Salada," to procure salt.

At sundown we reached "Abo," where I found my party comfortably encamped. This town is also one of the ancient ones; there are most extensive ruins scattered around in all directions; all built in the style of those at Quarra. Here, also, is a large cathedral. Its ground plan is in the form of a cross; the short arm is twenty-two and a half feet wide, the long arm is thirty feet wide; their axes, respectively, 27 feet and 120 feet; and at the head of the cross, there is a projection, about nine feet square; this makes the total length 129 feet. The areas, intersected at a distance of thirty-four feet from the head of the cross, or forty-three, including the projection. The areas of the cross coincide with the lines that pass through the cardinal points. In the east end of the short arm, there is a fine large window, the sides of which have what is called a flare, a style often used in Gothic windows. The walls of the church are over two feet in thickness, and beautifully finished; so that no architect could improve the exact smoothness

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RUINS OF ABÓ.

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of their exterior surface. From these descriptions of Quarra and Abo, from all one learns of "Gran Quivera," and from the walls of the houses, in the latter place, having, as Gregg has stated, the Spanish coat of arms upon their face, one must conclude that these buildings were erected by Spaniards, or, at least, under the direction of some Spanish padre.

As these remains of buildings have created all kinds of hypothesis,—some attributing their origin to Indians, and some to Spaniards, I have taken the pains to look into several of the most excellent histories of this country; such as Solis, Miguel Venegas, and Clavigero. Venegas states, that in 1538, Marcos Niza, a Franciscan, visited a large town called "Quivira," with houses seven stories high. Again, in 1542, François Vasquez Covonada marches north to the Rio Gila, and then east, to the great cities of "Quivira" and "Axa," near the kingdom of "Cibolo" and "Tigue." Pattarrax was king of this region; the riches of this people consisted of black cattle, (buffalo?) that are food, furniture, and clothing." This settles the question, that "Quivira" and "Axa" were originally Indian towns. This great kingdom of "Cibolo," (this word, at the present day, is used to mean buffalo,) although distant from the city of Mexico, must have been known to Montezuma, for we find the Spaniards struck with amazement at the sight of a singular animal in the zoological gardens of the Mexican monarch, such as they had not seen before.—Nor, according to Vanegas, was it known in "Sonora," or along the river "Gila." In Solis, this animal is thus described: "This greatest rarity—the Mexican bull, has a bunch on its back like a camel, its flanks dry, its tail large, neck covered with hair, like a lion; it is cloven-footed, its head armed like that of a bull, which it resembles in fierceness, with no less strength and agility." We know, from the present habits of the buffalo, that it confines its wanderings to the plains; and we know, from Vanegas and Solis, that it was not known in California or Mexico; it must, then, have come from the plains bordering the eastern side of these regions. Now, the Mexicans had a habit of giving names to men, significant of their achievements or adventures, and names to places, significant of events connected with their origin, or for something for which they were remarkable. Thus, the great Tezcucan prince was called "Nezahual-coyotl," the hungry coyotl, or wolf: "Nezahual-pilli," the prince for whom one has fasted: and the ancient name of Mexico, "Tenochtilan," signifies cactus on a rock.* It is not then assuming too much, to conclude that the kingdom of "Cibolo" signifies the country from whence the buffalo came.

We shall now compare the style of architecture in New Mexico, with that of the city of Aztecs. At Taos we now find houses seven stories high; at Acoma three stories; at Laguna they are two stories high, and built of stone and mud; while those of Quivira

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* For the Aztecs, in their wanderings, observed at the present site of Mexico, a cactus that had sprung from the crevice of a rock, and while looking at it, an eagle lit upon the cactus. With joy they hail this omen, and here build Mexico.

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were, according to Vanegas, seven stories high: and at Tagique the houses were evidently several stories high. Add to this, that at Quivira there is yet to be seen the remains of aqueducts. Now, I think it can be shown, that the people of Mexico and its immediate vicinity built their houses several stories high, while the other nations that the Spaniards saw did not build to a greater height than one story. Solis says, the city of Iztacpalpa consisted of houses two and three stories high. In the city of Mexico, he mentions that the king's jester lodged in the second story of the house that contained his zoological collections. He also states, that there was a thick wall, reaching from a neighboring mountain, with two open canals of stone and lime, of which one was always in use whenever the other required cleaning. In another place, "there appeared on one side two or three rows of pipes, made of trees hollowed, supported by an *aqueduct* of lime and stone." On the other hand, it is stated "that the Indians of the coast made their houses of stakes, interwoven with boughs and leaves, having in many places no other houses."

The present ruins of buildings that we find at Abio, Quarra, and Quivira, were erected by Indians under the direction of the Spanish priest; we find such men as father Kino, who settled among the Indians, urged by a zeal for the cause of the holy cross; and they soon obtained so great an influence over the Indians as to be enabled to erect "houses, chapels, to form villages and towns." Vanegas mentions a holy man, named Juan Padellas, who went to Quivira, shortly after the visit of Francisco Coronado. The soldiery never staid long in any of the Indian villages, they were more inclined to search for gold than desirous of instructing the natives in architecture, by erecting houses; or in architecture and religion, by the erection of chapels in which they worshiped.

In the history of Clavegero, one will find many things which tend to prove the most striking similarity between the ancient races that dwelt in New Mexico, and the tribes which people the region of Anahuac. Clavegero says, they "constructed, in their pilgrimage, many edifices in those places where they stopped for some years. Some remains are still existing, as we have already mentioned, upon the banks of the Rio Gila, in Pimeria, and near the city of Zacatecas." In another place, speaking of the emigration of the Aztecs, he says, "having passed the Red River, (Rio Colorado,) from beyond latitude 35°, they proceeded towards the southeast as far as the Rio Gila, where they stopped for some time; for at present there are still remains to be seen of the great edifices built by them, on the borders of that river. From thence, having resumed their course towards south-southeast, they stopped in about 29° of north latitude, at a place which is more than 200 miles distant from the city of Chihuahua, towards north-northwest. This place is known by the name of *Case grandi*, on account of an immense edifice still existing; which, agreeably to the universal tradition of these people, was built by the Mexicans in their perigrinations. This edifice is constructed on the plan of those of *New Mexico;* that is, consisting of three floors, with a terrace above them, and without any en-

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trance to the under floor. The door for entrance to the building is on the second floor, so that a scaling ladder is necessary; and the inhabitants of New Mexico build in this manner, in order to be less exposed to the attack of their enemies; putting out the scaling ladder only for those to whom they give admission into their houses. No doubt the Aztecas had the same motive for raising their edifices on the same plan, as every mark of a fortress is to be observed about it, being defended on one side by a lofty mountain, and the rest of it being surrounded by a wall about seven feet thick, the foundations of which are still existing. In the centre of this vast fabric is a little mound, made on purpose, by what appears, to keep guard over and observe the enemy. There have been some ditches formed in this place, and several kitchens utensils have been found, such as earthen pots, dishes, jars, and little looking glasses of stones itztli."

We are struck with the great similarity between the "casa grande," and the buildings at "Acoma" and the "Pueblo de Taos." Did we need stronger proof of the common origin of the New Mexicans and the Aztecs, we find it also in Clavigero, in the following words: "Besides, from Torquemada and Betancourt we have proof of it," (he means by it merely that the nations of Anahuac came from the north,) "on a journey made by the Spaniards, in 1606, from New Mexico to the river Tijon, 600 miles from that province, towards the northwest; they found there some large edifices, and met with some Indians who spoke the Mexican language."

I have made mention several times of the kingdom of "Cibolo." This kingdom was composed of *seven* towns; which calls to mind that the nations of Anahuac were composed of Xochimilcas, Tepanecas, Chalchese, Hahincas, Tlascalans, Colhuans, and Mexicans, seven in number; and they are said to have preserved this arrangement of tribes in all their wanderings.

And now let us try to locate the "Cibolo," or the kingdom of the buffalo. We find at the present time two places in New Mexico, which bear in their names traces of this "Cibolo." One is called "Cibolleta," and the other "Joya de Cibolleta." The first is situated about 60 miles west of the Rio del Norte; the latter is situated upon that river, opposite the mouth of the Rio Puerco. Vanegas states, that Vasquez Coronado marched from the seven towns of Cibolo to Tigue, on a river where he got intelligence of Quivira; and "that a body of Spaniards were sent thither, being 300 leagues further, along a level country, but thinly peopled." From this we learn that Coronado's party had to march some distance before reaching that river, and then had a long march, in order to reach Quivira; and that the country over which they passed was "a level country."

As has been already stated, Cibolleta is some 50 or 60 miles west of the Rio del Norte, (which is in fact the only river in New Mexico, and must be the one referred to on which Tigue was situated,) and one can march from Cibolleta to Quivira, and keep upon a level country, going through the pass in the mountains near Abò.

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Add to this, that Cibolleta is situated in a group with the towns of Moquino, Poguate, Rito, Laguna, Covero and Acoma; in all, seven towns, and only seven; the same number which composed the ancient kingdom of Cibolo.

The level country between Quivira and Cibolleta, would permit the buffalo to extend their range to the latter place.

Clavigero makes known a curious custom of the Indians of "Cibolo," which was not practised by the nations of Anahuac, but it resembles that of our prairie Indians; it is in using dogs to carry burdens. Clavigero mentions the dog of Cibolo, or dog of burden, "a quadruped of the country of Cibolo similar in form to a mastiff, which the Indians employ to carry burdens; several historians mention this strong animal."

Although these remarks may be looked upon as an unnecessary digression, yet they may be useful in attracting the attention of some more able investigator to this subject. I have made them as brief as possible.

November 5.—This morning, when about starting, we noticed some mule tracks that had evidently been made by animals under human guidance. They had come from the direction of Quarra, and after approaching quite near our camp, had retraced their steps, going back by the same route. We had been too long in the woods not to notice these things, yet we all tried in vain to discover the object of the persons. Towards midnight we had a severe shower; these tracks had been made subsequent to the shower.

We had quite a hearty laugh at our guide, who had never been beyond Chilili and Tagique, but still would not admit it. Yesterday, he had insisted that Abò was much farther off than it had proved to be; and now, to confirm what he said, he declares that there is another Abò. We feigned an intention of going there at once, when he cried out, that it was a dreadful place, "no hay, agua, pasto, leña, gente; nada, nada, señor."

Leaving the wagon to proceed slowly, I went over to the old church of Abò, is order to make a sketch of the venerable ruin. It is impossible to get any account of these hoary monuments from the inhabitants of the neighboring towns. We frequently questioned them with regard to such relics, but their responses were wrapped in the mystifying language of ignorance, or the very unsatisfactory reply of "quien sàbe." They view our inquisitiveness with a jealous eye, for they can only account for it by supposing that we are in search of gold, which tradition has said is buried beneath the altars and floors of these old churches. It is related of an old man who lived in Santa Fé, that after having amassed quite a snug little sum of money, he induced several others to join him in an expedition to Quarra, where he spent all his gains in digging in the aisle of the old church. The hole, now half filled up, still remains a monument of his folly. It is also stated, that while engaged in this search, he exhumed the bones of some one who had been buried beneath the floor of the building. They were supposed to have belonged to some priest; and at night, when the old man thought his comrades were all asleep, he went and knelt

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down, and invoked the soul that had once animated these bones with most humble entreaty and most powerful arguments and promises. He told the spirit, that as it had always been here, it must know where the treasure was deposited, which if left concealed would do no one any benefit; but if it would inform him, that he vowed by all most holy, to have these bones interred in sacred ground, and would purchase masses without number; but it was all in vain.

We had a fine road, and travelled on at the rate of three miles an hour. For the first five miles, we followed the stream on which Abo is situated; as we proceeded, it became perfectly dry. Its course is nearly due west to the Rio del Norte. As it goes through a narrow cañon, we were obliged to follow the road, which led us through a crooked mountain gorge, whence we emerged into the great valley of the Del Norte.

We saw a plant that bears some resemblance to tbe yucca, and is called "palmello angosta;" also, a "mahonia," the leaves of which are very much like the holly; this the Mexicans call "palomereo."

As we descended into the valley, we found a great and very perceptible change of temperature. The sun now seemed as if his influence was gaining the ascendancy over that of the snow-capped mountains; and when we reached the foot of the sierra, we found some beautiful plants still in full bloom. Continuing our journey, we, ere long, saw a large band of antelope dash across the road. This circumstance gave us hope of soon finding water; and, in a few moments more, we perceived a herd of cattle grazing near the road. When we reached them, we found several little ponds of water, and encamped alongside of them; having made a journey of 20 miles. We had scarce completed our arrangements, when a dark cloud came sweeping along the sierra, pouring down rain and hail; but it passed over us rapidly.

November 6.—Our road now led across a level plain, which consisted of a mixture of small gravel and sand. Although a good road at any time, still the shower of yesterday had rendered it more compact, and we made a rapid march, completing a journey of 18 miles by noon; when we encamped at "Casa Colorado," a little town on the banks of the Rio del Norte, near a large acqueia that passed between the town and the river. We here heard that General Wool had taken Chihuahua without any opposition, but we knew the Mexicans too well to place confidence in this report, and could only hope that it was true, without permitting the rumor to have any influence on our plan of operations.

In the afternoon, we went to pay our respects to the alcalde, and to ask some questions with regard to the surrounding country; but found our visit very unprofitable. He had some very old pictures, in large, oval frames, that had once been beautifully gilded. We asked him questions with regard to them, but all his answers were prefixed with "quizas," (perhaps.)

North of the town there are several large ponds; their surfaces were covered with ducks and geese, and long-legged cranes were

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stalking about their margins; but they will not allow any one, with a gun in hand, to approach.

We noticed several vineyards near us; the vines had been trimmed off very short, and were surrounded by mounds of earth, between 2 and 2½ feet high, to protect them from the frosts of winter.

November 7.—Hearing that some Americans were encamped near us, we sent a messenger to them, in order to inquire if they had heard any news from Chihuahua. We learned from Mr. R. Gentry the rumor that General Wool had entered Chihuahua; but no positive information had as yet been received.

Leaving Casa Colorada, we continued our way down the Rio del Norte. Having proceeded four miles, we crossed the mouth of the stream that rises near Abò. One mile more brought us opposite to the town of "Savinal." We also passed a cluster of "rancherias;" one set seven miles from one point of departure, and in sufficient number to be dignified by the name of "Rancbo de Mitra."

After marching 12 miles we encamped on a salt plain, by the side of the river, close by some cotton wood trees. Here we noticed some pools of beautifully clear water, and, on stooping down to taste of the inviting element, we found it perfectly saturated with salt. The plain around us was covered with a white efflorescence that one could scrape off with great ease, and, in a little time, obtain an abundance of salt.

November 8.—Last night the wind blew so strong as to endanger the stability of our tent. Streams of rain were driven against the cloth walls of our frail shelter by the strong northwest blast; for the wind had changed diametrically opposite to its course when we first encamped.

This morning the bad weather yet continued. A cold damp mist is incessantly descending. At length we saw gleams of sunshine now and then illumine the distant hills, and we started. About 12 o'clock the wind changed to the southeast, the mist ceased falling, and cleared away, but the blast blew chill, and we were fain to wrap ourselves closely in our "tilmas." After marching four miles we arrived opposite to the mouth of the Rio Puerco, and three miles more brought us to the town of "La Joya de Cibolleta." I was struck with this name when I first heard it, for it is not Cebolléta; but one finds in the name a trace of the ancient kingdom of Cibola. This place is "the jewel of Cibola."

We were much amused wiih the laconic replies of some persons that we met upon the road—whence do you come? "De abaxo," (from below.) Where are you going? "Arriba," (above.) What news have you? "Nada," (nothing.) Men who can give such non-committal answers certainly possess considerable finesse. There is much more wit in these replies than in the stereotyped joke of "comprendo pero no quiero," that is every where echoed through New Mexico. Alas the degeneracy of the times. *O tempora!* O mores! It would make Cervantes weep, and, in despair, burn up his works.

At Joya we purchased some corn for cur mules at the rate of $3

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the "fanega." Continuing on to Joyeta, which is six miles further, we encamped under a large grove of cotton wood trees in the vicinity of an acequiá.

The course of the river to-day was tortuous; high sand banks closed in on each side, almost obliterating the valley, except at Joya and Joyeta, where there are fields sufficiently broad for raising corn enough to supply the wants of the people, and to afford grazing grounds for their cattle. To-day we saw great quantities of the mezquit "prosopis glandulosa," and a curious evergreen plant, belonging to the zygopyllaceae, that gives out a very pungent odor, resembling kreosote. It occurs in dense spherical masses, similar to the common box, which, at a little distance, it resembles. Its height is not more than two to three feet. The leaves are entire, as large as those of the box, and shaped like the tail of the letter Q. It loves a sandy soil, and prefers the hill sides to the plains.

November 9.—From Joya we observed quite a change in the appearance of the country. The river banks are now heavily timbered with cotton wood; the high sand bluffs close in to the river, and the climate has become much milder, while the plants around show a great change of latitude. Of cacti four varieties have suddenly burst upon us, and there we found the broad palmated variety growing in magnificent luxuriance. The leaves, if I may so call them, measure 14 inches in length and 11 inches in breadth. We also saw a variety with a stem resembling that of a young shoot of the orange tree, one-third of an inch in diameter, with spines two and three inches long, and these covered with thin semi-transparent sheaths. The "C. undulata" covered the hill sides, mingled with the mezquit "P. glandulosa."

As we pursued our way along the river side, we saw many flocks of sheep that the "pastores" had driven in from the mountains, for fear of the "Navajoes." The whole country was in a state of alarm, and the road was lined with "voluntarios" hurrying to the rendezvous. At Sabino we found that many had already assembled, armed with muskets and escopettes, with cartridge boxes that were buckled round the waist, full of death-dealing lead and powder.

After passing through the town, we still found the people gathering together in little groups, the valley still full of sheep and goats, so that the hills resounded with their bleating. After marching 11 miles we reached Parida, and passing two miles beyond the town, we encamped at the foot of a high sandy bluff, which we will have to cross to-morrow. Our mules will then be ready for climbing the steep and sandy acclivity. "Socorro" is on the opposite side of the river, and one mile below us. From the hill near which we have encamped there is a fine view of Socorro and the ruins of "Las Hue tas," four miles below, as well as of Limitar, which is seven miles above. Between us and the above named places rolled the waters of the Rio del Norte, which are here bordered by groves of large cotton wood trees. In the back ground, about 10 miles to the westward, rises a range of lofty peaks, some 1,000 feet in

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height, and still farther west, some 20 or 25 miles distant, rise still loftier peaks, to the height of 3 or 4,000 feet, their tops covered with snow. The midday sun is quite hot, notwithstanding our vicinity to snow-capped mountains, and notwithstanding the severe frosts which nightly cover the ground, making the mornings bitter cold.

The rocks that strew our road are volcanic, a vesicular stone of dark purple color and hard as adamant.

We had a very long, steep, and sandy hill to climb this morning just as we left "Joyita," and we were stopped by another. It would be advisable for any one travelling with wagons to cross at Albuquerque, and keep down the river on the west side until reaching Valverde, where, I have been informed, the crossing is very good.

We noticed to-day numbers of the red-winged flickers, "Picus Mexicanus," and the meadow lark, "sturnella neglecta;" the latter bird was whistling as cheerfully as if it had no idea of the approach of cold winter.

November 10.—The severe frost of last night made a good fire very desirable, and the abundance of cotton wood all around our camp made the attainment of this desirable object very easy; the sound of our axes resounded through the groves, the men *gaining*, by their labor, warmth and wood, and soon a mountain *heap* of dry logs was crackling in the flames. We now despatch our breakfast, strike tents, and clamber over the hill that overlooks Socorro; descending this hill, we encamped on the west side of a little "bayou," having gone only 1½ mile. On the road we flushed several large flocks of quails. They happened to be at the foot of a high, perpendicular bank, when they rose up on wing until they reached the top, and then, alighting, scampered off with great rapidity. They had crests on their heads, and differed in color from the quail of the United States.

We encamped within sight of the train belonging to Mr. McGoffin; there were forty large Conestoga wagons in this train and a due proportion of men.

To-day we saw some Mexicans hoeing in wheat. It required 15 men a whole day to accomplish what could have been done by a "burro" attached to a harrow, in a few hours.

In the afternoon I went out to procure some of the quails we noticed this morning, but could not find any of them. I, however, got some of the spiral pericarps of the "prosopis odorata," or, as it is named by the Mexicans, the "tornilla;" also the mistletoe that grows so abundantly upon the cotton-wood, and is called, "bayote del alamo." The cockle burr and sand burr are very abundant, so much so, as to annoy us by sticking fast to our clothing and blankets; and our mules got their manes and tails so clogged as to be but masses of cockle burrs.

November 11.—This morning we started off in hopes of being able to cross the river and go down on the opposite side. At two of the fords we could not have crossed without getting our provisions and bedding wet. At last we found a good crossing a short

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distance above the town, but as the prospect of obtaining wood and grass on the other side was not very favorable, we concluded to camp directly in front of Socorro. I paid the alcalde a visit. He showed me his vineyard; each vine was heaped around with a pile of earth between two and three feet high, and the vines trimmed nearly off even with the top of the hills. The alcalde gave me some specimens of the lead and silver ores of the mines of that sierra which is nearest to Socorro, and said that in the same vicinity there are found gold, silver, copper, and lead. He also told me that Don Pedro Baca, of Manzano, once worked these mines, but that the quicksilver necessary for the amalgam costs $3 by the ounce, while at Manzano they obtain it from the mine with other metals.*

Socorro contains about 2,000 inhabitants, and is one of the largest towns we have yet seen, except Santa Fé. While walking through the streets I saw a party of Apache Indians quietly trading with the people, and was told that since General Kearny's coming here, and making a treaty with the Apaches, these Indians had behaved very well.

In the evening I got a fine specimen of the red-winged flicker, "Picus Mexicanus," also a creeper, "Picus querulus," which is called by the Mexicans the carpentéro, from its habit of chipping away at old trees.

November 12.—We are still without any information from below, but determined to move on slowly. We therefore packed up all our property and were very early on the road. After passing through the little town of "Las Cañas," we encountered another hill of sand, very difficult of ascent, and after we reached the top we commenced the descent through a crooked ravine that was strewed with fragments of rock. On the way we saw several flocks of crested quails; they were running along with great rapidity among the clumps of the "kreosote plant." We procured one of them; at the report of the gun only three or four rose up; they seem to depend more on their fleetness of foot than swiftness of wing. This bird proved to be the "Ortix squamosa," and has been figured and described in "Gould's Monograph of the partridges of America." The plumage is of a soft silvery grey, the iris hazle, and the crest fringed with white. The size, contour, and general character greatly resemble the common quail, "O. Virginianus." On opening the stomach, I found it filled with grass seeds and green insects of the genus "hemiptera."

We encamped about half a mile south of "Bosquecito," close by some large cotton-wood trees, overgrown with bunches of misletoe, still looking green and fresh, while the foliage of the tree was withered with the winters' frost.

In the evening we saw, on the opposite side of the river, the companies of Captains Burgwin and Grier, on their return to Albuquerque. Lieutenant McIlvane came over the river, and from him I learned that Captain Grier, with Lieutenant Wilson and two

* None of the ores that I obtained at Manzano contained quicksilver; still the people o Manzano agree with this alcalde in their statements.

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men, had had a fight with a party of Navajoe Indians. It appears that while the companies were on their march down the river, some Mexicans rushed hurriedly up to them, crying out that the Navajoes had just been into the village, murdering the people, and carrying off their flocks and herds. Captain Grier immediately set off in pursuit, and soon came in sight of the bold marauders. In a little while the Indians began to abandon the cattle they were driving off, until at last 400 head had been left along the route. So warm and exciting was the chase, that the officers, who were well mounted, heeded not the want of their men who were unable to keep pace with them, but they pressed on, anxious to recover the immense "cavalgada" of sheep that the Indians were yet driving. Suddenly they saw they had rushed into an ambuscade, for the Indians, rising up from their concealment, surrounded Captain Grier and his three brave companions. With horrid cries and shouts of "Navahoe, Navahoe," the Indians sprang forward to the combat; they were dressed for war, being ornamented with paints and plumes, and mounted on good horses, and armed with bows and arrows, and lances; but, fortunately, they were so crowded that they feared lest they should shoot each other. At length one of the chiefs came along side of Lieutenant Wilson; their horses were on the gallop, each one waiting until the horses should jump together, when, at the same moment, Lieutenant Wilson and the Indian fired; the officer's pistol did not go off, and the arrow of the chief only cut off a coat button, and lodged in the saddle blanket of Captain Grier. As the Indian turned his horse, a Mexican, who had started at full speed, came in contact with him, and rolled horse and rider in the dust; the Indian was immediately upon his feet, and rushed up to a dragoon soldier, who had a patent carbine, such as loaded at the breach, and had, unseen by the Indian, reloaded it, and the Indian coming up within two or three feet, the soldier shot him dead. One other Indian was killed, when Captain Grier ordered a retreat, and the four, drawing their sabres, cut their way out and rejoined their company, while the Navajoes succeeded in carrying off 3,000 head of sheep.

Lieutenant Wilson was again fortunate; being out on a patrole he captured a courier with letters to Chihuahua, which had been written by some of the principal men in New Mexico, and manifested a spirit of readiness for any insurrectionary movement.

November 13.—This morning I crossed the river at "Bosquecito," and went to the encampment of the dragoons. Captain Burgwin informed me that the traders were well prepared to defend themselves in case of an attack; that they had constructed quite a formidable fort of wagons at Valverde, and that the country in the vicinity of their camp afforded plenty of wood and grass, and, I therefore, determined to move down the river on the next morning.

November 14.—The day proving very favorable, we made a much longer march than we had at first intended, as we proceeded at least 10 miles below San Pedro, which place is 4½ miles south of Bosquecito. The road for many miles, in the latter part of our march, was covered with a deposite of saline substances, which lay like

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new fallen snow, and made an unpleasant glare, such as completely dazzled our eyes. We got some golden-winged woodpeckers and butcher birds, "lanins borealis," besides killing two large swans, "cygnus Americanus," that proved to be very fat. We encamped at "Bosque del Apache," far to the south of the last inhabited town that we shall see north of the Jornada del Muerto.

November 15.—Before the sun had risen, we were travelling on our journey, and soon reached the celebrated valley of Valverde. We now came in sight of the camp of traders. We found assembled here many gentlemen whom we had formerly met, and our happy feelings at greeting them in this wild country were heartily reciprocated. We camped close along side of them.

During the day a man entered camp, purporting to be a messenger from Captain Cook, and stating that Captain Cook, finding his men and animals failing, and his provisions giving out, had changed his destination, and would now make a descent upon "El Paso." We were glad to hear this, as it was the people at that place who had made several demonstrations of attacking us here. But there was something about the man that excited suspicion, and the traders refused to furnish him with the mules which he said were necessary to enable him to carry on Captain Cook's letters asking for reinforcements. This man showed sealed letters from Captain C. directed to Captain Burgwin, but, notwithstanding, his whole story was an unprincipled fabrication, as we afterwards learned.

The traders will suffer great losses on account of our difficulties. Every pound of freight brought to Chihuahua costs 18 cents; if stopped at Santa Fé, 9 cents; and all here say that if the duties of $1,000 a wagon load have to be paid they will lose everything.

November 16.—We were all scant of provisions. The traders have been at this place for the last forty days, and in that time have consumed their provisions, for they made no arrangements for such a prolonged stay. Common sugar and coffee cannot be had for less than 50 cents the pound, and beeves sell for $20 the head. To employ our time, we went out gunning and killed a loon, "colymbus glacialis;" several ducks, 'anas merganser." On our return, we saw a fine bald-headed eagle that was sitting on a bar in the middle of the Rio del Norte. We hailed it as an emblem of our victorious banner, which bears this bold bird on its folds.

November 17.—This morning I started for Socorro to procure corn for our mules. The "grama" is not sufficiently nourishing for animals that have been laboring hard. We had rumors to-day that the American traders in Chihuahua were allowed perfect liberty, except Mr. McGoffin and Señor Gonzales; that goods are bringing 37½ cents per vara, which is one-third more than many persons here are ready to sell for.

November 18.—During the morning, we walked over the ruins of Valverde. They were inhabited in 1820 and 1825, but constant depredations of the Apaches and Navajoes forced the people to desert their village. Nothing now remains but the ruins of some adobe walls, over which stillness reigns. I took a sketch of the

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town and the river valley beyond, filled with cotton trees; the high, flat "mesa," covered with a sheet of volcanic rock, and the grand snow-capped Sierra, that rises in the distance. This valley of Valverde has been very highly spoken of, but it is of narrow limits, and its soil is sandy.

November 19.—While paying a visit to one of the traders' camps, I saw the Indian method of grinding corn. A large slab of volcanic rock had been obtained from the neighboring "mesa;" this was then worked into a level surface and placed in an inclined position, to form the "metate" upon which the corn, that has been previously parched to render it more crisp, is placed and ground with an oblong stone.

Last night a Mr. Phelps, who had left his home to try the health restoring climate of the Rocky mountains, died. Being in the last stage of consumption, he had hoped that the pure air of the prairie might ameliorate his disease. Notwithstanding the beneficial effects that pure air may produce, yet the exposure under the thin canvass walls of a tent; the long journeys during days of heat and cold; the deleterious effects of the deprivation of the various conveniences of civilized life; the necessity of travelling daily, whether the patient be sick or well, more than cancel the good influences of the healthful climate.

November 20.—We have a great deal of ice in the Rio del Norte; at one place it was sufficiently strong to bear the weight of a man. We found some of our friends making atole,* which is a very dilute kind of mush made of the flour of parched corn.

We learned that Colonel Doniphan had not yet concluded his treaty with the Navajoes, and was expected in eight days, and several companies were already at Socorro.

November 21.—We were delighted by the arrival of several Americans, who confirmed the report that two companies of Colonel Doniphan's regiment were at Socorro. One can never believe the New Mexicans; not that they are wilfully liars, but they are so ignorant that they see nothing clearly, but judge as if looking through a glass darkened, and give word to the conception thus derived, which generally proves false.

The Mexicans are remarkable for their ceremonious politeness; in meeting each other they generally embrace and uncover their heads, after which each runs through a long formula of inquiries after friends and relations, and ends with good wishes and invocations of the protecting care of God, the virgin, and the saints. To-day some one greeted a Mexican who appeared with the common salutation of "Viva usted mil años;" he instantly replied, "and God grant, sir, that you may live to see the last year of the thousand."

From what I have been informed, the profits of the Santa Fé traders are in this proportion: Goods, such as calicoes or prints that are bought for 10 cents, sell for 37½ cents; and cazinets and

* The "atolle" of Clavigera.

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cloths, costing about 25 cents, sell for $2. A wagon contains from two to three thousand dollars worth of goods.

November 22.—We have had some news to-day that caused quite an excitement. The people of Chihuahua have had spies out, far advanced in the direction of the route by which General Wool will have to approach, and they now say that he is not coming at all. This has so encouraged the Mexicans that they have determined to send a force here and capture the wagons and valuable goods of the traders.

November 23.—A cold wind, that continued to blow all day, obliged us to gather around our camp fires; but even then it was almost impossible to be comfortable; one must keep constantly revolving in order to have all sides warm.

While sitting by the fire last night, we heard the sound of horses' hoofs on the frozen ground; hailing those who approached, we found that they were from a trader below, who was sending to Socorro to procure medical aid for a sick man, and to inform us all that he had received most positive information with regard to an intended march of the Mexicans from below, and urged all to join in an application for the volunteers at Socorro to come down and encamp where they would be ready to assist us.

November 24.—When we first arose, the river was frozen across, but by breakfast time the ice was floating down the rapid current in great quantities, with a constant murmuring sound as the fragments grated together.

The river is here full of sand bars. At one place we plucked a reed, "arundo phragmites," and without difficulty threw it across the river, which at that place was not more than 50 feet wide to the bar, but the water is now very low.

As one of the axe helves had been broken, we were forced to supply it with a piece of "mezquit;" it was very difficult to get a straight piece of sufficient length.

During the day, we sent up an express to the volunteers, desiring them to move down the river.

November 25.—This morning we walked down to a trader's camp below us. We found he had made preparations for remaining here some time. His men had constructed a log house, which they had thatched with poles and rushes, so that it was quite comfortable.

On our return to camp, we found that the volunteers had come down the river, and had encamped on the opposite side, about two miles above us.

November 26.—The weather is still extremely cold; the river was again running full of ice, and the water in the camp buckets had frozen to the thickness of three inches; still, the midday sun feels very warm.

This morning I got a sparrow-hawk, "Falco sparverius." To-day I heard an anecdote that accounts for one of our common sayings. It is related that a white man and an Indian went hunting; and afterwards, when they came to divide the spoils, the white man said, "You may take the buzzard and I will take the turkey,

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or, I will take the turkey and you may take the buzzard." The Indian replied, "You never once said turkey to me."

November 27.—We now moved our camp to a more sheltered position, where we had plenty of cotton wood trees, and at once commenced building houses, having procured adobes for the chimneys from the ruins of Valverde.

November 28.—This morning I got a little sapsucker, "sitta Carolina," a bird that is often seen creeping on the under side of limbs of trees that extend horizontally; they have three toes runeing forward, and only one backward, but their bill resembles that of a woodpecker.

We heard, this morning, of the death of two of the volunteers who were encamped near us. These men had gone off from camp five or six miles without any weapons, when they were attacked by the Navajoes, who shot them down with reed arrows, and then beat out their brains with rocks; and the Indians drove off 800 sheep. A party of thirty immediately went out in pursuit of the murderers. By the last advices they had not overtaken them.

We heard to-day, that General Wool had joined General Taylor, and that they had taken Monterey. The person bringing this news, formerly an officer in the English army, had come direct from the city of Mexico. He is now at Señor Algier's camp.

During the morning I saw Mr. Glasgow, formerly our consul at Mazatlan. He had received a letter from some friends in Chihuahua, confirming the news of the battle of Monterey. We also learned that 700 Mexicans had come up from El Paso, and had arrived in sight of our camp on the day the volunteers reached here, and seeing the latter, had retired.

During the morning I went out to see some mules that were branded with the letters "U. S.," when the drivers showed me a certificate signed by Lieutenant Stoneman, dated in the vicinity of the copper mines, on the Gila. This gave us news of the safety of Captain Cook, but obliged us to let the mule drivers retain their mules.

November 29.—A day of cold drizzling rain, during which Mr. R. F. Ruxton, the Englishman previously mentioned, entered our camp. He told us that after the battle of Monterey there was an armistice for six weeks; that General Taylor had been ordered to advance upon Tampico, and that Santa Ana had ordered his troops to fall back on San Luis Potosi, where he was concentrating all his forces. Some of the traders seem to think that he will be able to raise an army of 30,000 men.

Mr. Ruxton brought a paper from the English minister, desiring all American officers to extend every facility to English traders on their route to Chihuahua; also other papers, in which it was stated that traders of all nations would be permitted free egress, even Americans, provided they came with Mexican drivers. We also heard that twenty-one of Mr. Spier's men—this Spier forced his way to Chihuahua in spite of pursuit by the United States dragoons—had perished in the mountains, of hunger and thirst, whilst endeavoring to escape into Texas; and that General Armijo had gone to Durango;

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that Ortiz, the cura of El Paso, had led the troops that came to capture the wagons of the traders; and that the people of Chihuahua had made six copper field pieces.

November 30.—To-day we employed much of our time in building, although there was a drizzling rain that was unfavorable for labor; yet we accomplished the filling in of the warp of light poles by weaving with rushes. This afternoon we had a festive scene at the camp of a trader from Missouri, who still had some fine claret wine and some good old brandy. We had many tales of wild adventures of prairie life, and hair-breadth escapes. We heard of Mike Fink, who, with two other desperadoes, for a time lived in the Rocky mountains. There Mike would shoot a tin cup off the head of one of the trio for some trifling bet. One day, under the wager of a keg of whiskey, Mike fired away at the tin cup and his friend dropped. "There," said Mike, "I've lost the whiskey, I shot a little too low." True, the bullet had entered between the eyes of the cup bearer. Shortly after this occurrence, Mike had an altercation with the second man, and, remarking that he had one of the best rifles that was ever shot, *the other* drew a pistol and killed Mike *dead*; and this man, on his way to St. Louis, to stand his trial, jumped overboard and was drowned in the waters of the Missouri. Thus, as the narrator stated, perished three of the most desperate men known in the west. Many more tales were told, of Glass, of Colter, and others, but one only I will relate, as it throws some light on the character of the New Mexicans. A few years ago the Mexicans had been endeavoring to defeat the Apaches; not succeeding, they persuaded a party of 140 to come into Chihuahua, under the pretence of making peace with them. Having given them plenty of aguardiente, they fell upon the intoxicated Indians and killed them; one woman ran to the church, hoping to be protected by the sacredness of the sanctuary. The instinct that compelled her to seek safety here was awakened, not only for the preservation of her own life, but for that of another yet unborn; but nought avails: they seize her, they drag their victim to the grand porch and cut her to pieces, tearing out a living child; they baptize it, with fiendish mockery, and then its soul is sent to join that of the dead mother!—and now, at this very moment, many of the scalps of these unfortunate beings hang dangling in front of the church, a choice offering to the saints. These are deeds of the descendants of those who came to erect the blessed symbol of the cross, who, with such holy horror, cast down the idols of the Aztecs, and abolished the horrid rites and execrable sacrifices of the priests of Huitzilo polchili.

We, this evening, received a dispatch from Captain Walton, of the Missouri volunteers, desiring all the traders to combine at some one point for their better defence, as he had received information that rendered such a movement necessary.

December 1.—The month came in with much wind, scattering the foliage of the cottonwood trees, and rustling through their boughs. During the morning we had an alarm of Mexicans, but it originated from the approach of a "mulada" that belonged to some of the

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traders. We busied ourselves during the day in completing the construction of our houses, and soon finished the thatching of all the walls; they already afforded great protection against the rude December blast.

During the day, a Mr. David, a trader, had some of his mules run off by the Indians.

In the evening we learned that Mr. Glasgow and several of the traders had started to Santa Fé, hoping to meet Colonel Doniphan and get some positive information with reference to the place where they should be constrained to winter.

This morning Mr. Kerford's train moved down the river, and formed camp near "Fray Cristobal," which is 15 miles *below*. Mr. Kerford is an Englishman, and having an English passport, is very anxious to go on to Chihuahua, as well as Señor Algier, who is protected by a Spanish passport. The coming of Mr. Ruxton, with letters assuring foreigners that their property would be protected, has made many of the traders very anxious to proceed, for some of them have as much as 150,000 dollars worth of goods at stake.

This morning we completed our "adobe" chimney, plastering it within and without with mud, and we have now a complete structure, save the roof, which shall be made if we remain here any length of time.

Mr. Ruxton came over and sat a while with us. He said that he was going out deer hunting in the morning, and I told him that Reymond, who was a good shot, would accompany him, hoping that the latter would share the good fortune of one who had been very successful in hunting. Mr. Ruxton said that while he was at El Paso he met three Americans, who had been taken prisoners by the Mexicans four months previous. These persons had left the United States to go to California, by the way of Sonora; they were seized as spies, at the instigation of a man whom they had employed as guide from Santa Fé. The Mexicans had taken all that these poor fellows possessed, and they were now almost starving there, for they allowed them only a handful of "frijoles" and a few "tortillas" each day. Mr. R. said that he remonstrated with several persons, and with the cura Ortiz, who acknowledged that they were ignorant men, without any knowledge of the Mexican language, and in every way unfit for spies; in fact, that it was evident that they were no spies; still, however, these men were detained, and having tried to make their escape while Mr. R. was at El Paso, they were recaptured; all this in direct violation of the treaty between the United States and Mexico, which stipulates for twelve months' notice to Americans and Mexicans; besides, it was known to the Mexicans that these men had left before they had any knowledge of the war.

December 3.—Again another day of commotion; many going hither and thither. During the morning, we saw a long train of wagons pass, belonging to Señor Porros. All of us are most anxiously awaiting news of Colonel Doniphan's movements, and are heartily tired of staying here.

December 4.—To-day Captain Walton rode down, and expressed

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his positive determination to prevent any one from going to Chihuahua until Colonel Doniphan should arrive. This evening, however, all the traders assembled and drew up a letter to Captain Walton, desiring that Mr. Kerford should be allowed to proceed. His goods have come through the United States from England, in the original packages, and have been, thus far, free of duty; and now, if they are brought into competition with the goods of the other traders, it will be ruinous to them; but if Mr. K. is allowed to proceed at once, he will pass on through Chihuahua towards Zacatecas and Durango. As he has an immense stock of goods, this arrangement was greatly desired.

December 5.—The hunting party returned; they had been unsuccessful, although they saw many deer and wild turkeys. To-day we went up to Captain Walton's camp, when we found that he had gone down the river to visit his picket guard at "Fray Cristobal." On my return I got a fine specimen of the Mexican meadow lark, "sturnella neglecta."

December 6.—In accordance with the arrangement which I yesterday made with Captain Walton's commissary, I sent up my wagon to-day for some provisions. We obtained all we wanted, except sugar. While at the camp, we heard that one volunteer had been shot by another, in a brawl. We heard to-day of the death of Lieutenant Butler, Colonel Doniphan's adjutant. This news cast quite a gloom over our feelings, for he was much esteemed by all who knew him. Every moment we are expecting a mail, and ardently desire to hear the news, to be enabled to shape our course so as to reach the United States by the speediest route. The evening was extremely unpleasant; it was hard to tell whether it was raining or snowing. We cut down some huge cotton wood trees, and turned our animals loose to browse upon the tender bark of the twigs.

December 7.—During the morning I was busily engaged in skinning birds, we had killed eight Mexican blue birds, "sialia occidentalis." They differ from the blue birds of the United States, in having the back brown, and the wings tipped with black, and are more delicate in their contour. We find great numbers feeding upon the mucilaginous berries of the misletoe, which, in this vicinage, grows upon every cotton wood tree.

December 8.—We procured several specimens of the red winged flicker, "picus Mexicanus." On dissecting them I found their stomachs full of ants. In the evening, Mr. Houck, Mr. Kerford, Mr. Harmony, El Señor Algier, and El Señor Porros, arrived at our camp; they were going up to see Captain Walton, in order to make a more formal representation.

December 9.—Spent this morning in hunting quails, in the vicinity of the "mesa" below us; procured a female "ortix squamosa," in fine plumage. There are several coveys of these birds in the neighborhood of some sand knolls; but the ground is so overgrown with clusters of artemisia, and the birds run so rapidly, that it is difficult to see anything but their tracks on the loose sand.

This evening, we heard that Colonel Doniphan was approaching,

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and that Major Gilpin had already arrived within a few miles of us. There was also a rumor that General Wool would march to Chihuahua, but that he had gone by the way of Monclova.

December 10.—This morning I went up to "Parida," in order to purchase provisions. The river was full of floating ice, and for some distance from the shore it was yet unbroken. We were obliged to get logs and break a road for the wagons, and even then it was with considerable difficulty that we succeeded in urging the mules into the river. When we arrived at the opposite shore, we found Major Gilpin and his command. The men were without tents, and constant exposure to the cold and snow, on the high sierras of the Navajoes country, have given them a pretty ragged looking exterior. After we had proceeded five miles, we met Colonel Doniphan and his staff. He said that he should march for Chihuahua, as soon as the artillery should arrive from Santa Fé. We recrossed the river at San Pedro, and at dark reached "Parida," where we stopped at the house of the alcalde, Don Miguel Baca. He asked me if "El Señor Don St. Jago Polk, no està el Presidente de *nuestra* republica." I found out that he considered himself a citizen of the United States.

December 11.—Everything has just doubled in value, beeves are now worth $20 a head, and corn $6 the fanéga.

December 12.—The kindness of these people was remarkable; they gave us numerous presents of "ponche," or tobacco, and "chili colorado." At 9 o'clock we started, after having embraced the whole household. We were struck with their politeness; they always uncovered their heads when offering a light for our "cigarito;" and, when they made any movement, prefixed it with "con su licenceá Señor." When an old patriarch of the village entered, they all rose and uncovered their heads; he, too, was a Baca.

About dark we reached our camp at Valverde, when I received several letters; and amongst them an order from the adjutant general, directing me to repair immediately to Washington city. I had already two orders to the same effect, one from General Kearny, and the other from Colonel Doniphan; and, as it was not known which way Colonel Doniphan would proceed after reaching Chihuahua, I determined to return at once to Santa Fé, and thence proceed to the United States, which was the only route open to me. Many of my friends represented the undertaking as almost impossible, but there was one trader who had crossed the prairies in the winter; and, as he had done it, I did not see why it might not be done again; moreover, my orders to return had to be obeyed.

December 13.—I obtained five beautiful specimens of the "ortix squamosa;" as the arsenic that we had obtained in St. Louis had been taken to California, I was obliged to fill the skins with corn meal.

In the afternoon we saw Captain Walton's picket guard returning; it had been relieved by Major Gilpin, who was now at Fray Cristobal, from which place he would proceed to San Juan, as soon

VALVERDE.

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as his animals had rested a day or two, preparatory to crossing the terrible "Jornada del Muerto."

December 15.—This morning, at 9 o'clock, we left Valverde for Santa Fé. On the opposite side of the river, at the crossing, we met Colonel Doniphan. He said he had been highly gratified with his march into the country of the Navajoes. From what I could learn, they build in a style similar to the people of Acoma, Santo Domingo, and the other Pueblos of New Mexico. They belong to the great Apache nation, together with the Cyotleros and Mezcaleros, of the southern regions, all of which tribes are said to speak the Apache language. Some of Colonel Doniphan's command visited the people of Zuñi, and succeeded in establishing peace between them and the Navajoes.

Before we had gone more than half the day's journey from Valverde, we overtook a party of eighteen men, who had left the employment of some of the traders, and were now on their way to the United States. I at once took them in my employment, considering myself most fortunate in thus obtaining a party in complete readiness for the intended journey, which would obviate the necessity of delaying in Santa Fé.

Continuing our route on the west side of the Rio del Norte, we encamped this evening near the little town of San Antonio, which is fourteen miles north of Valverde.

Although our mules have had nothing to do for the last four weeks, yet the cold and the insufficient nourishment to be derived from the grama grass had left them in a poor plight. One of them gave out to-day, and the men I left to drive it up, could not get it to camp.

December 16.—This morning I represented to the men I had engaged yesterday, the trials and difficulties that we would most likely encounter, and I insisted particularly that they should purchase a new set of mules, as those they then had were poor, and would inevitably die before they could get across the prairies.

This morning we passed Major Mitchell's command. Although his men were mounted on mules, still they presented a fine appearance, owing to the good discipline and regularity observed on the march. They had just passed us, when we heard a rustling of sabres, and looking round, saw the men all on foot, leading their mules. The movement was performed with such perfect unity, that one must necessarily judge them to be well drilled. I recognized in the ranks some brave fellows who had been with us through the country of the Kioways and Camanches in the fall of 1845. At noon we reached Socorro, which is by this route 27 miles north of Valverde. Passing four miles beyond the city, we encamped on the bank of the river.

We have now a journey of 136 miles to accomplish before reaching Santa Fé, where we will be in nine days.

We passed to-day a deserted town, which we were told had been left on account of the continued depredations of the Navajoes.

This morning I started off and walked as far as Limitar, for I had counselled my men to walk as much as possible, in order to

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prepare for the arduous journey before us. I wished now to enforce what I had so strenuously advised by my own example. Besides, I knew that this exercise would be of great personal benefit, as my constitution had not yet entirely recovered from the severe shock it had sustained from my illness in August. On our road we saw great numbers of redwinged flickers, shore larks, wild geese and brant; also many varieties of ducks, among which were the mallard, the merganier, and the teal. We saw also many cranes, the "grulla" of the Mexicans, but they were not so numerous now as they were when we came down the river. Although ornithologists have determined that the blue crane is only the white crane in its first plumage, still we did not see a single white crane during our exploration of New Mexico.

Arrived at the town of Limitar, the people came out in great numbers, bringing us mules to sell. I bought two fine ones, and exchanged a horse for a beautiful "macho," which, although a little wild, was indeed a valuable mule; he had never had a scar on his back, and was large, fat, and beautifully formed. Before the day's march was over we placed the "macho" in the wagon, and he worked as if he alone would drag the whole load. I found among my new men one named James Dobson, who had at one time been a soldier in the army, and had had the advantage of having crossed the prairies several times. I am but too glad to have one who has served in such a good school for acquiring perseverance and fortitude.

December 17.—Before we had proceeded far, we met a party of Colonel Doniphan's men with flocks of sheep and herds of cattle, on their route to join the army. In a little while we entered "Sabino," having crossed the mouth of the "Rio Puerco," which was perfectly dry. On our way we shot several mallard ducks, "anas boschas," and brant geese. In the evening we encamped near "Coralles," at the hacienda of El Señor José Chavez, having obtained the permission of el Señor. In an acequia that lay near our camp we saw several "muskrats," "ondatra zibethicus," but they were beneath the ice, and we did not shoot for fear of the ball glancing.

December 18.—Before starting we called on Señor Chavez to pay for the "zacate" that we had taken to feed our mules. He told me that he had lately lost a son, who had been carried off by the Navajoes, and that several of his peons had lost their wives and children. I was introduced to the ladies of the household; they had their faces covered with a thick coating of some whitewash that concealed every feature except the eyes. This preparation is not put on because they consider it ornamental, but, as I have been told, to protect the delicacy of the skin from being spoiled by exposure; for these ladies seem to think the "reboso" an insufficient guard to their beauty.

The females of the lower class love to ornament their cheeks with paint or pokeberry juice; the latter, when dry, makes them look abominable.

We made a long march, encamping at "Lentes," and passing

through the towns of Corales, Belen, Saucillo, Galvadones, and Lunes. At Belen I obtained some beautiful specimens of selenite, such as the people of this region use to glaze their windows. They also calcine it and mix it with water, and with this mixture whitewash the facades of their dwellings and churches.

December 19.—Starting at daylight, we reached Isletta at noon. Here we saw a beautiful antelope, "dicranoceros furcifer." It had been wounded so that the pueblos had captured it, and it had now become perfectly domesticated. At Padillas we tried to purchase corn, but the people wished to receive $4 the cestal, (a bag ¾ vera wide by 1¼ veras long.) We passed through "Pajarito," and in the evening crossed the Rio de Norte and encamped at Albuquerque. We found the west side of the river to be much the best for loaded wagons; one thus avoids those terrible sand hills at Joyeta, at Socorro, and at Bosequecito; however, one must be cautious in crossing the Rio del Norte with wagons containing such immense loads as the trader's wagons, for some of the traders told me that the bottom of the river is not sufficiently firm to bear great weights.

At Albuquerque we found Captain Burgwin and Captain Grier, with their troops quartered in the adobe houses. They find the place very healthy, and the surgeon, Doctor Simpson, tells me that there is no sickness except amongst the Mexicans, who have lost many of their children by the measles and the whooping cough.

Around the soldiers' quarters the sentinels were stationed in all directions, even on the tops of the houses, and the strictest vigilance was observed, no one being allowed to pass with the countersign unless recognized by the men on post.

December 20.—We now bade adieu to our brother soldiers, who seemed only to regret that they were not also going back to the United States. On our road we found much snow, which had apparently been on the ground several days; it was thawing fast, and the air was extremely chill. At Alemeda we stopped to purchase corn. One of my men came and told me that he had just been bitten by a dog. I told him to shoot it, which he did. When the poor woman heard the report of the pistol, she came immediately, crying out, "mortéron mi perro, mortéron mi perro," and looked dolefully. Indeed, I heartily pitied her, but she certainly ought to have kept such a dog tied, and it would not have been killed. Some Mexicans afterwards looked at the man's leg, but they seemed to think it was a mere trifle. We now pass through the pueblo "Sandia." On our march we saw a great many flocks of shore-larks, and many ravens, while the blackbirds, in immense flocks, were hopping about the fodder-stacks and sheds of the corrales. In the evening we reached the pretty little town of Bernalillo, and we encamped close by the neat haciendas at the northern extreme of the town. Here are the handsomest and best arranged vineyards in the whole department, and the houses show a greater appearance of wealth and comfort.

December 21.—In the morning, when I called to pay the charges of our landlord for the use of his corral, and for the bundles of

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"zacate" that our animals had consumed, he would not be persuaded to receive one real, exclaiming: "No, señor, no es vale nada." We made but a short march, and encamped about a mile to the north of San Felippé, among some old cultivated fields, which afforded grazing for our animals. While here, we saw many of the Indians of Santo Domingo, and we endeavored to induce them to bring "zacate" for our mules, but they seemed not to understand us; in fact very few of them understand the Mexican language.

December 22.—Last night we had a stampede among our animals, and this morning several of them were not to be found; I had lost one mule, and some gentlemen who accompanied me from Valverde had lost three horses and two mules. There was no doubt but that they had been driven off by some ill disposed persons during the night.

The rest of our mules were quite wild and difficult to catch. As I wished to try my skill with the "lazo," I gave chase to one of the swiftest. As I have so often been obliged to mention the "lazo," I will now attempt to describe it, and the method of using this weapon. The best "lazos" are made of strips of hide, generally of four strands, which are beautifully plaited; it has at one end an iron ring about an inch in diameter; through this the thong, which is about one-third of an inch thick, is passed to form the noose, which is so adjusted that the ring shall be at the extremity of the noose farthest from the hand. In this way it is grasped by all the fingers of the right hand, which thus serve to keep the noose open. The remainder of the lazo is neatly coiled, and rests on the forefinger of the left hand, while the extremity of the thong is firmly held by the remaining fingers of the same hand. As the thong is between forty and fifty feet in length, one is obliged to swing the noose horizontally until it acquires sufficient centrifugal force to reach the object of aim. The coils on the forefingers now pass off until at the exact moment, when, with a jerk of the left hand, the noose is made to close; then a turn is instantly taken around the pommel of the saddle, (if the person be on horseback,) which saves the rider's being pulled from his seat. In New Mexico there is no one "hidalgo ó puchero" who is not well skilled in the use of the all-powerful "lazo."

While we were searching for our lost animals, some of the Indians of Santo Domingo warned us not to go to Santa Fé, as the Mexicans were going to kill all the Americans there. We, however, left several men, with directions to continue the search for the lost animals, and proceeded with the intention of encamping on the "Rio de Galisteo."

On the road we saw four coyotls or coyotes, "canis latrans," and made several shots at them, but we were unsuccessful.

When we reached Galisteo creek we found plenty of water, which, although covered with ice, yet that could easily be broken.

December 23.—We were up before sunrise, and I had my mule saddled and started at a rapid pace. The day was pleasant, although cold. The snow that lay upon the ground seemed to increase in quantity as the distance to the city of Santa Fé dimin-

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ished. At length I approached "Ciénéguilla," and attempting to save distance by going across a marshy spot of ground, my mule immediately sank into the treacherous slough. As the ice was sufficiently strong to bear my weight, I soon got clear of the saddle. I now strove to extricate my mule; she made several desperate efforts, and then seemed to resign herself to despair. The ice, which had supported her thus far, now offered the greatest impediments to her efforts. I ran back a short distance to a place where I had shortly before seen a Mexican; he had gone. I now returned and took off the saddle and bridle also, lest the fear of the severe bit should prevent the mule's full exertions, and taking hold of the extremity of the lazo, I succeeded in turning her head towards the point where she had entered the quagmire, and soon succeeded in drawing out my "mula." For some time she trembled like an aspen leaf with cold and fear, seeming to think the solid ground a dangerous quicksand.

I soon overtook a Mexican who had a bottle of aguardiente, which he offered with great politeness. I eagerly accepted his proffer, for my pantaloons were covered with ice, from the mule having sunk so deep as to wet the housings of my saddle.

About midday I reached Santa Fé and found all the Americans there talking of an intended insurrection which had fortunately been discovered. Sentinels had been placed in every direction, all the field pieces and heavy guns had been parked in the plaza, every thing was in a state of preparation and every body in a state of vigilance.

The chief conspirator was Don Tomas Ortiz; he arranged the organization of the several detachments and the plan of attack; one company was to assemble in the church called the "parroquia," another in the valley of "Tezuque," north of Santa Fé. In the dead of night, at a signal from the bells of the church towers, the conspirators were to rush into the streets, seize the guns and massacre the whole body of troops.

The persons of the governor, Charles Bent, and the commanding officer, Colonel Price, were to be seized by parties appointed for that purpose.

December 24.—The artillery are busy making preparations to march, in order to reinforce Colonel Doniphan; the clanking of the anvil is incessant; caissons and gun carriages are strewed around the forges. At this juncture it is almost doubtful whether the safety of our citizens does not require that the artillery should remain.

It is expected that the wagons loaded with money for the troops will be attacked; a company has been sent to warn and escort them.

We hear that San Miguel is in a state of insurrection, and the whole country seemed rife and ready to tear down the glorious stars and stripes; to tear down the nest of the eagle from the rugged mountains of the west. The noble bird looks down from his lofty position and sees through the puerile attempts to dislodge him. Beware, beware of the eagle!

Since my arrival here, I had a long conversation with Mr. St.

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Vrain about the practicability of going to the United States by the way of the Canadian, the route I followed in 1845. He cautioned me not to attempt it, as he had been warned by the Kioways of a settled determination of the Camanches to kill all the whites who should attempt to go through their country, and therefore he had not sent any persons to his trading houses on "El Rio Cañadiano." This hostile feeling on the part of the Indians has been produced by the great mortality which has this year prevailed among their children, which these superstitious people attribute to sorcery, saying, the whites have made a great medicine, and have blown an evil breath upon our children, and they vow to wreak vengeance upon the white man.

December 25.—As to day is Christmas, we endeavored to make our time pass as pleasantly as possible. During the day Captain Fischer's company of Germans paraded in the plaza; they were in excellent discipline and excellent order, and have worthily been dignified by the soubriquet of the "star company." They are regarded with pride by all Americans and with awe by the Mexicans.

We were quite anxious with regard to the safety of Lieutenant Walker, Colonel Price's adjutant. He had been sent to arrest Diego Archilet; in the evening, while we were at Colonel Price's quarters, he entered; he had not been able to capture the Mexican, and said that while searching his house, the people of the vicinity collected and manifested the most decided disapprobation; in fact, they assumed quite a threatening attitude, and seemed half inclined to attack him and his party.

A second detachment was sent off to capture Salezar, that infamous man who cut off the ears of the Texan prisoners who died on the route from San Miguel to Chihuahua.

In the evening two other prisoners were brought in; they had been exciting the Indians of Santo Domingo, and had succeeded in organizing a body of 300 Pueblos, when the plot reached the ears of some officers, who immediately started with a company of men, and appearing suddenly before the town, they got hold of one of principal chiefs and threatened to bring the artillery from Santa Fé and level the town with the ground, unless the two Mexicans were given up, and they were instantly surrendered.

At night we walked through the city; patrols were marching in all directions. During the night the countersign was changed, which caused us to be arrested by one of the sentinels. Fortunately, the officer of the day, Captain Weightman, was near, and relieved us from our predicament.

December 26.—I spent the day in preparations for my journey. As the wagon that I had brought had been much wracked by the rough roads over which it had passed, I therefore exchanged it for another, and procured some tools that would be useful in case of any breakage.

This evening Governor Brent gave an entertainment at the palace, which had formerly been occupied by ex-governor Don Manuel Armijo. We had all the luxuries of an eastern table, and delightful champagne in the greatest abundance. Indeed, we con-

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cluded it was better to revel in the halls of the Armijos, than to revel in the halls of the Montezumas, for the latter were poor uncivilized Indians, while the former may, perhaps, boast to be of the blood of the Hidalgos of Castile and Arragon.

December 27.—I had postponed leaving Santa Fé until Monday; nevertheless, I was obliged to attend to business during the day. I found that some of the men whom I had engaged had been tempted, by the price that the government was offering for mules, to dispose of those they had obtained at low rates when we passed through Socorro. Men who would thus break their engagements and promises were no loss to me. So I had their places filled by others; indeed, I had more applicants than I wished to receive.

I called to take leave of Colonel Price, and he most kindly furnished me with copies of all the papers relating to the intended insurrection.

I now found it impossible to obtain the funds which would be necessary to buy corn, and to defray the expenses of my party down the Missouri river. At length, Mr. St. Vrain generously offered to let me have sufficient for my journey.

December 28.—This morning we had a severe snow storm, which prevented my starting at daylight, as I had intended; for I proposed reaching the ruins of Pecos in one day. The snow fell heavily, so that we could not see the road; but, as the sky showed signs of the storm clearing away, I started off my command at 8 o'clock.

We had a difficult time clambering up the steep sides of the mountain. The ground was frozen hard, the rocks slippery with snow and ice, and our animals, unable to get firm footing, were constantly falling. When we reached the mountain summit, which is about 11 milles from Santa Fé, we found a party of volunteers encamped there. They had built large fires of pine logs, and were so busy warming themselves that we could not get a word from them. Still further on, we met the alguazil, Richard Dallum, who had succeeded in arres ing Salazar.

Our road was strewed with the carcasses of oxen. Some were half devoured by the wolves and ravens, others had not been dead long, for the birds of prey had only torn out their eyes. Constantly encountering these repulsive sights, we at length reached the cañon from which Armijo so "ingloriously fled," and then encamped in the neighborhood of a large train of commissary wagons, which were going to Santa Fé. The wagoners had been greatly annoyed by the Indians, in crossing the prairies; they told us frightful tales of the bold daring of the savages.

December 29.—The sun now came forth from among the clouds, which he soon dissipated, and his warm rays rapidly melted the snow and ice, which impeded our progress. In several of the deep mountain gorges the lofty crags of granite beetle so high that an eternal shadow rests around. In such places the snow and ice had accumulated, and our animals found great difficulty to keep their feet.

I procured a beautiful jay, "corvus stellarius," and was able to

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preserve the skin. I also obtained a beautiful yellow finch, which proves to be the "fringilla vespertina." In the evening I sent some men to the village of Pecos, which is 2½ miles from, and to the north of, our camp. On their return, they said that they saw, near the ruins of Pecos, a curiously carved stone. It was now too late to see this carving, and we marched so early in the morning that I must needs leave this stone for some one else to examine.

December 30.—We saw, to-day, great numbers of magpies, which, in company with the ravens, were feasting on the innumerable carcasses of oxen that still strewed the road. We saw large flocks of stellar jays, which were flying gaily amongst the groves of cedar and piñon that cover the hills and valleys.

We have a fine view of the valley of the Pecos river, in which lies the town of San José, at which place I encamped; for I had heard that the route through this town was six miles shorter than that through San Miguel.

At this place the river Pecos is 50 feet wide; its waters are beautifully clear, and flow along with great rapidity, as if anxious to mingle with those of the Gulf of Mexico, into which they empty after having joined those of the Rio del Norte, at the Presido del Rio Grande.

We had an excellent road to-day; it is formed from the crumbling down of the coarse decomposing granite rocks, which form the neighboring sierras.

December 31.—We were all up before daylight; and, having given our animals a liberal allowance of corn and "zacate," we started, highly delighted with the idea of saving several miles by going direct to "Ojo Vernal," instead of passing through San Miguel. Having, with infinite labor, succeeded in mounting the high bluff which borders the river, we selected the plainest road, which seemed to be marked with the wheels of American wagons, but before we had proceeded far, a severe snow storm arose. We now urged our animals rapidly forward, with the intention of reaching the timber, where we should be sheltered from the violence of the storm. The wind blew, with great force, directly in our faces; the snow fell thick and fast; we could scarcely see, and our animals could scarcely be forced to face the cold blast. Every moment our progress was more and more impeded, as the falling snow increased in depth; at length, we reached a forest of pine and piñon. We now encamped, and the men soon heaped up huge pine logs, and, having set them in a blaze, we gathered around, endeavoring to dispel the numbness which had seized our limbs. After several hours' continuance, the storm at length ceased, and we resumed our march. Nearly all signs of the road had, by this time, become concealed by the snow; but we followed, as well as we could, the track we had been pursuing, until we found ourselves involved among precipitous cliffs and impassable ravines. We were now obliged to retrace our steps, and soon got out into the country where we could see. The storm had entlirey cleared away. We could now perceive the high "mesa," which lies between San Miguel and Ojo Vernal. We, therefore, took a course direct for this

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mesa; and, before we had marched far, we arrived at a hacienda, where we obtained a guide, who soon put us on the right road. About sunset we reached the village near Ojo Vernal, and encamped. The man who drove my team was nearly frozen to death. He complained much of a sensation of sickness, and the men were obliged to rub him for some time, in order to restore circulation to his system. I gave him a large dose of rum, and had him taken into the house of one of the Mexicans. This man, had he walked as others did, would not have suffered.

The snow was now five inches deep. Towards evening a fresh breeze sprang up, which drifted the snow along the surface of the road. Everything was covered; even the dark forests of pine and cedar were hidden beneath robes of white; and now and then, when shaken by the wind, they cast off the snow in clouds that rose up like smoke bursting from cannon's mouth. At the village where we encamped, were some men, who had just returned from a hunt. They had killed several black-tailed deer, "cervus macrotis." These animals exceed the common deer in size, and in the length of their hair; their tail is round, and has a large round tuft at the end; their ears are very large.

January 1, 1847.—This morning, at an early hour, we made our arrangements for marching. We had passed the night quite comfortably, for the snow was so piled around our tents that the wind could not gain admittance. The morning was excessively cold, clouds of snow were drifting about, borne rapidly along by the strong wind. I now found that one of my men was ill with the measles. I wished to leave him here, where he could be taken care of, but he preferred to proceed; so I had him wrapped up warmly and put into the wagon. The man who came so nigh freezing yesterday, had recovered sufficiently to be able to walk. In a little time the wind died away, and the sun arose; his genial heat was truly grateful to us. The snow commenced to melt, and the walking became slippery and extremely laborious. After a tedious march, we reached "Vegas." Here one again meets with the infinitely extended prairies, which give birth to the tributaries of "El Rio de los Gallinas," and of "El Rio Moro," and following on in the direction of the "El Rio Cañadiano," are at last limited by the cross timbers. It is from "Los Vegas" and "Tacalote," that trails have been made which cross the Cañadian at the mouth of the "Arrojo de los Yutas." This is the shortest route to the United States, and would be the best route, if the road was definitely marked out. At "Vegas" I tried to purchase corn for the "cavalada," but the only person who possessed the corn, prepared as I wished it, seemed determined to take advantage of my necessity, and asked me an exorbitant price. Having offered in gold the price I had been accustomed to give, it was refused, and I was placed under the necessity of taking the corn, and notified the owner to that effect. The town was in a state of great excitement from the occurrence of some recent depredations of the Arrapaho Indians, who had driven off the flocks and herds of the Mexicans, and had killed and scalped the "pastores." We everywhere

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heard horrid accounts of diabolical mutilations to which the bodies of the victims had been subjected.

The Americans here, too, seemed anxious about some insurrectionary symptoms which were daily developing.

January 2.—We procured as much corn as we could well carry in our wagons, and I gave the owner a draft for a blank amount, leaving the quartermaster to decide what was the market price. We were detained a long while in crossing some "acequias," which had been filled with water during the night, and were now covered with ice. It was with great difficulty that our mules could be forced upon the ice, they had become so fearful of falling, and it was near eleven o'clock before we got clear of these troublesome acequias.

Soon after crossing the "Rio de los Gallinas," we saw large herds of antelopes, apparently from two to three hundred animals in each herd, but the snow on the ground exhibited the hunters in such bold relief as to prevent all possibility of approaching them without being observed. One of our hunters, by the name of Raymond, seeing the fruitlessness of continuing the pursuit, drew up his rifle and fired, although 400 yards distant; we all felt deeply disappointed when we saw the whole herd bound away, but before they ran very far one of them stopped and lay down, and soon a second shot laid it on the ground to rise no more. Shortly after this occurrence, we met a train of 50 commissary wagons going to Santa Fé. They had no corn for their oxen, and the poor beasts were suffering from want of sustenance and from exposure to the cold. Several of them lay dying by the road side. We encamped near "El Arroyo de Sepullo," at the foot of a lofty mass of rocks which completely sheltered us from the winds. Here we built our fires, and at night the huge projecting masses of rock, which beetled over our little camp, seemed, as they were illuminated by the ruddy glare of our fires, to be threatening to topple down. I suffered intense agony from my feet having been frosted. The greatest relief I could obtain was by keeping them firmly pressed to the ground. I had inadvertently mounted my mule after having walked in the wet snow, which had soaked through my moccasins, and when I came to dismount my left foot was frozen fast to the stirrup, so that I was obliged to draw my case knife and use it to free myself.

This morning the wind blew keenly, but we started before the sun was half an hour high. After marching one mile we reached the crossing of the Sepullo. Here we had a siege of troubles. The ice was very thick, and it required some time to cut our way across the stream, for the ice was not sufficiently strong to bear the weight of the wagons. The river banks were steep, and as the wagon rushed down to the water, the mules became frightened and swerved from the road we had cut, and, getting upon the firm ice, they were not able to keep their feet; several of them fell, and one, after making many vain efforts to rise again, gave up in despair, and we were forced to drag him out of the stream by main strength. As he had got very wet, and the air was freezing cold, we had to keep

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him moving about lest he should die. In a little while, by the help of ropes, which we attached to the uppermost felloes of the hind wheels, we dragged the wagon out, and immediately hitching up the beast that had got wet, we kept him in brisk motion until his limbs regained their wonted flexibility.

Having marched four miles further, we reached "El Rio Moro," and by being extremely careful to cut away all the ice, we crossed without any accident. But the fording of these rivers delayed us so long that our day's march did not exceed ten miles.

We encamped about three-fourths of a mile from the road, in a mountain gorge, where the high precipices which surrounded us completely protected us from the cutting winds. We had snow water for our own use, and drove our mules to a spring which was about a mile distant, near "Ponds in the prairie."

One of my men was perfectly overcome by the cold, and gave up entirely. We were obliged to put him to bed and we gave him large doses of rum. He complained of a pain in his chest and seemed to be tormented with extreme thirst.

This evening the duty of guard mounting commenced; I cautioned the sentinels to be vigilant, which was hardly necessary, as my men had already heard, at "Los Vegas," of the Arapahoes and their horrible attrocities.

January 4.—We were up long before day; the wind blew biting cold until ten o'clock, when the sun shone forth with some warmth.

We now noticed a great many prairie dogs that had come forth from their habitations to enjoy the sun's rays. I fired several times at different ones with a shot-gun; I wished to obtain one without injury to the skin, but I did not succeed in killing any.

Naturalists say, that the prairie dog remains dormant during the winter season; wherever we met with the villages of these little animals, we found them as lively as if it was summer; we must, therefore, conclude that this animal does not hibernate.

We saw great numbers of the antelope, they had congregated in dense herds, and were seeking shelter from the cold winds in the deep valleys and gorges.

Soon we arrived at some volcanic hills; which rise up just before reaching the "Rio Ocate;" in their vicinity there was but little snow. Here we found that the fore axletree of our leading wagon was broken in the hub of the wheel. With great care we managed to reach the Ocate, but were obliged to unload before we could cross. Here we encamped, and endeavored to make ourselves as comfortable as possible. We had plenty of cedar wood for fuel, but not one stick of timber fit to repair our wagon.

Near our camp were the carcasses of several oxen, upon which the wolves and ravens were gorging themselves. I also noticed some beautiful magpies, "Pica melanoleuca," and I killed a fine one.

January 5.—We now endeavored to patch the broken part of the axle. The lower "skeen" of the spindle was broken, we changed it for the upper one, and then started, determined to proceed until we should be obliged to leave this wagon. After marching five

miles, we reached a deep gorge, into which we prepared to descend. There I found the "sand-board" of some wagon which had been broken in passing this abrupt declivity. We achieved the descent in safety, but just we as arrived opposite the salt lake, the wagon wheel broke entirely off. I immediately ordered the mules to be unhitched, and we set to work to splice the broken axle-tree. The piece of wood that I had picked up was of good seasoned oak, and of the exact width of the axle-tree. By sunset we had finished the wood work, and it was now necessary to put on the irons.

To-day we saw great numbers of antelopes; in one herd there must have been nearly two hundred; and the prairie dogs were running about as if it were not winter. The morning was quite warm, and the little snow upon the road thawed rapidly. Several of my men are now sick with the measels; the poor fellows are suffering much. We are obliged to travel, and can take no care of them, and they are necessarily very much exposed to the inclemencies of the weather. Those who yet retained their wonted health attend to their duties with such zeal as seems to show that they know how much depends upon their efforts; and I am truly grateful to them for their support.

January 6.—At 3 o'clock this morning we were awakened by the beating of the snow against our tents. The wind blew a hurricane, and the pelting of the snow flakes sounded like pattering of hail. We had been obliged to encamp in an open valley, by the side of the wagon which had been broken; and in this exposed situation we had to abide the fury of the storm. Fortunately it soon cleared away, and we were able to resume our labor of repairing the axletree.

Our mules were loosened from their pickets, and permitted to range in the neighboring forests of pine and cedar, while the guard built large fires, and under the shelter of the trees passed their time more comfortably than any others of the party. At length we finished our work, and commenced packing up our baggage. I noticed around our camp great numbers of skylarks, ("alauda alpestris.") Some idea may be formed of the immense numbers in the flock, when I state that 25 were killed at one shot. Among them were several snowlarks, ("plectro-phanes nivalis,") one of which I skinned.

After returning to camp, we saw the ravens engaged in chasing some of the birds which had been wounded. They showed themselves as skilful in hawking as the falcon genus, and in a little time they captured five or six birds. Then an amusing scene took place, for the successful bird-catcher was sure to be attacked by some of his fellows, who endeavored to make him drop his prey. We did not interfere, for we thought it best to let the wounded be devoured at once, than to die a lingering death.

At two o'clock this evening we commenced our march. The road was covered with snow, which was in many places very deep, and in some places covered with a hard crust, which was sufficiently strong to bear the weight of our mules, although it broke through beneath the wheels of our wagon. Towards evening we met some

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men who were plodding their way on foot to Santa Fé. They said that they had been obliged to leave their wagons on account of the depth of the snow, as it was impossible for their half-starved oxen to drag them any further. They spread the most discouraging reports among my men, with regard to the possibility of passing the Raton cañon; stating that the snow was five feet deep, and that the hill sides were covered with ice.

We encamped near the head of a little stream which empties into the Ocate, in a grove of cedar trees. The evening air was biting cold, and the faces of the men, when they first gathered around the fire, were covered with frost-work and ice, from the congelation of their breath; icicles hung from the hair on their foreheads, and their moustaches and beards were one mass of ice. This night was so bitter cold that I found it was vain to get asleep, and went out and sat at the watch-fires of the guard. Not a cloud was to be seen, the air was beautifully clear, and the brilliant constellations blazed so brightly as to appear to have approached a few millions of miles nearer to our globe.

January 7.—After marching about six miles, we crossed the "Rio Rayado" on the ice, which was sufficiently strong to bear the weight of our wagons. Here we saw the train of commissary wagons, to which the men whom we met yesterday belonged. A few persons had remained to take charge of the train; they seemed to think that they would have to spend the whole winter here.

Passing onward, we commenced the ascent of a long hill; it was the lee side, and the snow had settled here to the depth of from one to two feet. Every few moments we were obliged to stop and rest our animals. It was with infinite labor that the poor beasts succeeded in floundering through the deep drifts, until they at length arrived at the plain from which the snow had been blown, when our progress became comparatively easy, and we soon reached "El Rio Cimaroncito." We had much trouble in crossing this river, being obliged to unhitch the mules and work the wagons across by hand.

January 8.—At four o'clock this morning, our animals were turned loose, to graze upon the tender shoots of the willow and what else they could find.

The wolves had become emboldened by the feeble resistance they had met with from the broken down oxen which they find on the road. This morning they attacked our mules, wounding one badly about the nostrils, and gnawing off the "cabrestoes" of the rest.

As we did not intend to march this day farther than "El Rio Vermijo," which was only ten miles distant, we did not start until the sun had risen. We were encamped between the forks of the river; as it was necessary to cross the other branch, we roughened the ice with axes, and scattered sand and gravel over it. As the banks were steep and frozen, we tied the hinder wheels so that they could not revolve, and wrapped the felloes in contact with the ground with coarse chains, to increase the friction; and having attached ropes to the hind axletree, so that we might hold back, men were stationed at the head of the wheel mules, to force them to hold back. All being now ready, we moved slowly up to the

crest of the declivity, when instantly the wagon rushed down, in spite of all our precautions, and with such velocity, that the leading mules were overtaken; and wagon, and men, and mules, all were thrown together in one confused heap. Fortunately no one was hurt, nor anything broken. Some of the men now sprang to work, and unhitched the mules, when they regained their feet; after waiting until they had got over the fright, we again geared up and ascended the opposite bank.

About noon we reached the "Rio Vermejo;" here the ice bore up our wagon, and we descended to the river without difficulty. But the bank to be ascended stalled us; however, after a considerable delay we got over this difficulty, and immediately encamped. The constant labor and severe exposure my men had undergone, rendered some episode necessary in order to break the continuity of pains and trials; I therefore took some of the Indian goods with which I was provided, and parcelled them out into prizes, to be shot for with rifles. We spent the whole afternoon in shooting; and for a while we seemed to forget the past and to cease thinking of the future.

January 9.—We arose very early, and before the clock had struck five we had commenced our march. The snow upon the ground made more light than otherwise there would have been; as it was, there was difficulty in seeing the road.

During the greater part of the day it threatened to storm, and the atmosphere was so filled with minute particles of snow that we could scarcely see further than two or three miles around.

As we approached El Rio Cañadiano, we found that there had been but little snow there.

During our progress, we were continually starting herds of antelope from secluded valleys, where they had sought shelter from the inclemencies of the season. The day was extremely cold, and the snow-mist completely chilled us. It was only by continued friction of our hands that we succeeded in retaining their flexibility. Several times my moccasins froze to my stirrups. We pressed rapidly onward, and before noon reached the "Cañadian," and found an excellent camping ground, where we had plenty of dry timber and enough grass to appease the hunger of our half famished mules. Our day's march was twenty miles, which was a great march, for during the early portion of the day we had much snow upon the road.

January 10.—We now have but little snow upon the ground around us. The sun shines as if his power was trammelled by the benumbing influence of the cold. Although there was but little wind, yet we were glad to get sheltered from that little by our entrance in the pass of the Raton. Here stupendous escarpments of rock rise on each side of us, until they attain the height of 3,000 feet.

The first hill we met gave us considerable trouble; we were obliged to apply all the force we could muster to the leading wagon, and then return for the other. This method of carrying them up one at a time detained us a great while. At one place,

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the road took the bed of a stream; the ice had been repeatedly overflowed and frozen, so that it was now very thick, and too slippery for us to venture upon. We were compelled to ascend the western bank, and after proceeding about 40 yards, were obliged to re-cross this stream. When we came to descend the bank, we found one practicable place, and there the bank was not only steep, but sideling, and, to prevent the wagon from sliding off, we were obliged to fix ropes to the top, and to cut a deep channel for the wheels. It required a long while to prepare the declivity, for the ground was frozen extremely hard.

January 11.—This morning we found that all our mules had gnawed their ropes asunder and gone off. For a long time we searched in vain in various directions. Some of the men even went as far back as the Rio Cañadian; at last they were all found in a mountain ravine not far from our camp.

At 10 o'clock we commenced our march; we were continually obliged to cross the stream, which was very tortuous and had high banks. These crossings were full of difficulty. The mules would run on until they reached the frozen stream, when they would suddenly stop, and the wagon, rushing down the declivity, would throw all the animals in a heap on the ice. At one time every one thought that some of our animals were killed; one mule was thrown across the others, and it was with great difficulty that we could extricate them and set them on their feet. We now formed a strong pioneer party, and sent them in advance with their axes, pick-axes, and spades, to break the ice, to strew it with sand, and clear away all obstructions.

At last we commenced ascending the ridge which separates the waters of the Arkansas from those of the "Rio Cañadian." We reached the top of this dividing ridge in safety; but, as we commenced to descend, one of the wagons slid off sideways, and the fore wheels being suddenly caught by a deep rut, the axle snapped off in the wheel. We put the greater portion of the load into the other wagon, and, having lashed a long pole so as to support that extremity of the axle which had been broken off, we dragged the wagon to our camp at the foot of the slope.

One of the men killed a deer during the day; and we endeavored, as well as we could, to console ourselves for the misfortune of the axle with a feast of venison.

As we were determined our mules should not gnaw themselves loose again, we, this night, made them fast with the trace chains.

We were now 17 miles from the Canadian, and had this day marched 11 miles.

To-day we saw some curious birds, which our old hunters called the "paisano;" its true name is the "geococeyx viaticus." It is so little known that I have appended a description of it to these notes, *written by Major G. A. McCall.*

"The geococeyx viaticus, which the Mexicans familiarly call the "paisano," (countryman,) is found in Texas, from the river Nueces to the Rio Grande, in Mexico; from the seaboard, at least, to the

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Sierra Madre; and, being an inhabitant of chapparal or thorny thickets, he rarely ventures beyond its borders. Although the toes of this bird are disposed in opposite pairs, as in other species of his family, yet the outer hind toe being reversible, and of great flexibility, is, in either position, aptly applied in climbing or perching, as well as on the ground. Thus, he at times pitches along the ground in irregular hops; and again, when the outer toe is thrown forward, he runs smoothly and with such rapidity as always to be able to elude a dog in the chapparal, without taking wing. He feeds on *coleoptera*, and almost every species of insects; and near the Nueces, where the snails, "lymnaceus stagnalis," abound, it is greedily eaten," &c.

I have only to add, that this bird is found throughout the Raton pass, and some individual specimens have been seen on the Arkansas river, a few miles to the west of Bent's fort.

January 12.—In some of the ravines near our camp, and in the cañons of the mountains, there is still to be found sufficient grass for "muladas," not more numerous than ours. We, therefore, drove our mules into the mountain, and then set ourselves to work to repair the broken axletree. As we had carefully treasured the pieces of wood that we found on the road, we soon obtained a piece well suited to our purpose, and again we lost a whole day in repairing this unfortunate breakage.

In the evening Brown went out to hunt, and soon returned, saying that he had killed two black tailed deer. As he was unable to bring them to camp, he had thrown his coat over them to keep away the wolves until he could get mules and bring them in.

As I had had no exercise during the day, I started back with Brown in order to get the deer. The country over which we passed was intersected by deep ravines, and some of the hill sides were so steep that it was with great difficulty we forced our mules to proceed. At length we reached the deer, and found them untouched by the wolves. Having packed them upon our mules, we returned to camp.

These deer were of the species called "cervus macrotis." Brown said that he had seen several mountain sheep during the day, but they were so wild that he could not approach them. They are the "capra montana" of Harlen. I have found them as far south as Valverde, in New Mexico.

On the 13th of January we again resumed our march, feeling much refreshed by a day of rest. We had several difficult crossings to make and steep hills to climb, but my men did their duty bravely. As the sun shone forth with considerable warmth, the snow commenced to thaw, and the road became slippery and muddy. Three times we were forced to travel in the bed of a stream for a long distance. We were obliged to cut up the ice with our axes for a distance of fifty or sixty yards, and then to clear out the pieces which choked up the stream, before the mules could be forced to proceed. At length some of my men rushed into the water, notwithstanding the season, and catching the mules by their heads,

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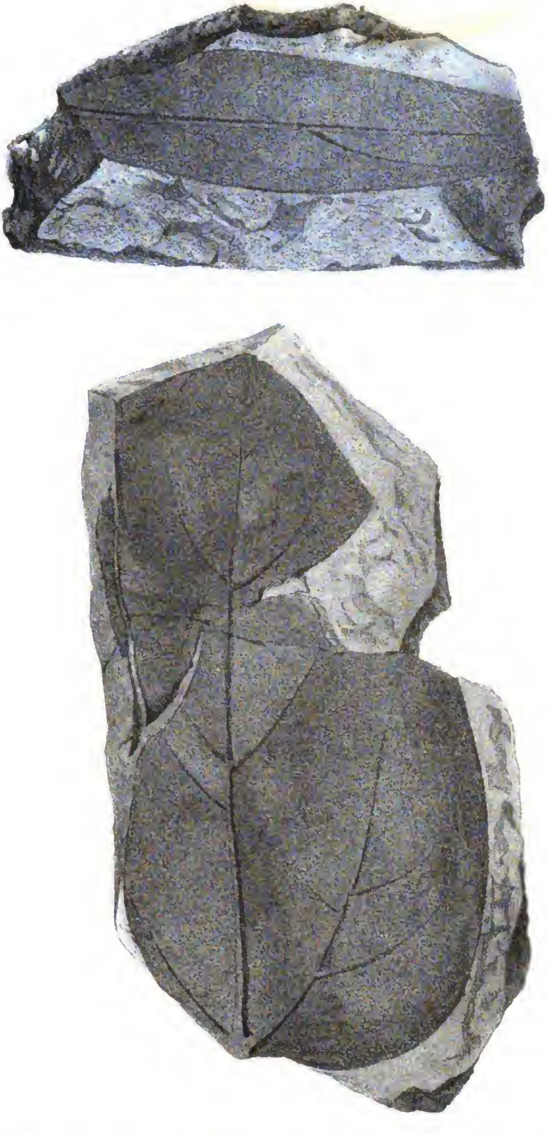

Fossils from the Coal beds of the Raton
Lat. 37.° 15'. Long. 104.° 35'.
(For Locality see Map of 1845.)

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they forced them to keep in the middle of the stream, and effectually prevented them, notwithstanding their frequent attempts, from leaping up the banks on either side.

We now reached one of the steepest acclivities we had seen in the whole journey. We took all the mules, and as many of the party as could find room at the wheels, and carried our wagons up one at a time. It was painful to see the poor beasts so terribly beaten, and shocking to hear the blasphemous oaths which were uttered; but all seemed to forget themselves in the excitement of the moment, while they strained every nerve, and while the woods resounded with whooping and yelling. When we reached the top of the hill, the old pine trees of the mountain sides shook with deafening shouts and cheering. To look at this hill, it would seem impossible for loaded wagons to achieve the ascent.

Before we had proceeded far, we found several broken wagons; the tongue of one of them was of hickory; this we took, as we wanted helves for our axes, and pickets for our mules. We made an early camp near a grove of dead cotton wood trees, and close by the road side; we built large fires, and every one had his roasting-stick loaded with venison, which was soon sputtering before the flames. Although we were many hours on the road, yet our day's march did not exceed eight miles.

January 14.—Not long after leaving camp we reached the last difficult hill that we would have to encounter, for the remainder of the road from here to Bent's fort rises and falls in gentle slopes.

As soon as I had seen the wagons safely over this hill, I took Laing with me and set off for some coal beds which I had formerly visited on my way to Santa Fé, when I had not been able to find any traces of ferns; but as Laing had once worked in a coal mine, and seemed to be positive that he could find me impressions such as he had seen in the carboniferous formations of Missouri, I set out with renewed hopes; but after a long search he was obliged to confess that there were none. We however obtained several specimens of the fossil leaves of dicotyledonous plants. These were of two sorts: one a lanceolate leaf, resembling that of the willow; the other a large cordate leaf, like that of the catalpa, and both sorts of leaves are distinctly marked with branching veins. This formation extends throughout the Raton, according to the report of my hunters.

The specimens of coal and of fossils which I procured here, as well as all the geological and mineralogical specimens collected during the exploration, have been submitted to the inspection of Professor Bailey of West Point, who has kindly consented to examine them.

While hunting fossils, large flocks of stellar jays came flying along the bluff; they were chattering noisily, and in this respect they are like our blue jay.

We soon overtook the wagons, and about 1 o'clock we reached the "Rio de los Animas," or Purgatory. Here we found a large train of wagons, and saw some of the teamsters who said that they had taken their winter quarters here, and that they should wait until

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spring before venturing to cross the Raton. They told us that game was very abundant; that they daily killed great numbers of the black-tailed deer, common deer, antelope, and turkeys. There is excellent dry wood here in great abundance; the stream is lined with groves of dead locust and cotton wood, which have been killed by fire or inundation.

We were now clear of the much dreaded pass, but our troubles still continued; the measles seemed to be spreading amongst my men, and already four of them were so ill that we had to lift them in and out of the wagons. We marched 14 miles.

January 15.—We made an early start this morning, and after a march of 12 miles we reached "Holes in the Prairie," where we encamped. As we knew that we should find no wood here, we brought a large quantity from the Purgatory.

The road over which we travelled was quite level, and entirely free from snow. We therefore reached our camping place at an early hour. There we met Captain Murphy, who was conveying several wagon loads of specie to Santa Fé.

I told him of the state of feeling in New Mexico towards our people, and learned that he had already been put on his guard by an express, which he had met near Bent's fort.

He told me that my mules were too poor to go through this trip, and cautioned me against the Arrapahoes, who, he said, were then encamped near Chouteau's island, and who had a great number of mules that were branded with the letters U. S., which they refused to give up. He also informed me that all the grass was burnt up on the prairies between Pawnee Fork and Council Grove.

In the evening the wind suddenly changed to the north; it became very cold, and before night we had a snow storm.

As our mules were losing flesh fast, notwithstanding our feeding them with corn every night, I determined to adopt Captain Murphy's plan, in letting them run loose all night.

To-day another of my men was taken ill; his eyes were terribly swollen, and before evening he seemed to be the sickest man in the party.

January 16.—Although our mules had strayed off some distance, still we managed to catch them all in good time, and at 1 o'clock we reached "Hole in the rock," where we encamped in the centre of an extensive forest of cedar. Huge trunks of these trees lay strewed around in all directions, and there was plenty of good grass and water in our vicinity. In a little time, fires were kindled on every side; each person had one of his own to sit by; the dense foliage of the cedar trees completely sheltered us from the wind. Could we always have had such a place as this to camp in, we could never have suffered from the cold.

During the march we saw a great many prairie dogs. Laing killed one with his rifle, but the bullet had mangled the little animal so that it was not worth skinning; this dog was so fat and looked so nice that we had it cooked, but it seemed to be very tough, and it had a flavor which was not altogether palatable.

January 17.—Last night the wind blew very hard from the south,

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but we were so comfortably situated that we did not heed it much. This morning it was still blowing with great violence, although at our backs; our mules travelled slowly, and would not go fast. We saw great numbers of antelope, but killed none. After marching six miles we reached a cañon called the "Willows," through which the "Timpa" flows. I had intended encamping there, but the wind rushed through the gorge at such a rate that our tents could not have stood a single instant. We therefore proceeded two miles further, and encamped again in a grove of cedar trees, on the margin of the valley of the "Rio Timpa." We could not find any dry wood and were obliged to use the green cedar, which made pretty good fires, and as it crackled in the cheerful flames gave forth a delightful odor.

The Timpa was quite hidden from view, as the banks are perpendicular and about 20 feet high. Although a few cotton wood trees grew along the bottom of the stream, they were hardly tall enough to be seen. The ice was so thick that it was with difficulty we could obtain water for ourselves and our animals. We found that it was not so salt as that nearer the mouth of the stream.

January 18.—We left camp as the sun was rising. The air, although still, was biting cold. Our breath condensed instantly upon the collars of our coats, every part of our faces was covered with frost-work. Our road being level and in good order, we progressed rapidly. Passing a little to the north of the usual camping ground we encamped.

Here we found a few sticks of wood, which had been left by some preceding travellers, and the greatest abundance of prairie sage, "artemisia," which burns brilliantly and throws out a great heat. But it consumes so rapidly that it keeps several persons busily engaged supplying the fire with fuel. One of my men killed an antelope during the march. Although we saw a great quantity of game daily, still the extreme cold deterred every one from hunting.

As we approached the three conical "buttes," which are described and figured in the report of the journey pursued by Lieutenant Peck and myself, in 1845, we found an innumerable quantity of fossil shells of the genus inoceramus; the calcarious rock on which these shells are found is of a slaty fracture, and breaks into very thin sheets, which are covered on both sides with impressions of those shells.

January 17.—We had a long search this morning for our mules, which had wandered off to a great distance during the night. It was ten o'clock before we succeeded in catching them all. I now started for Bents' Fort, having given directions to my party to camp as soon as they reached the Arkansas river. I reached the fort at 2½ o'clock after a rapid rot over a distance of 27 miles. Herds of antelope abounded on both sides of the road. They were feeding among the wild sage which covers the valley of the Timpa. As my approach set the herds in motion, the startled hare would spring up before them and dash across my road.

Having reached the fort, I immediately made my arrangements

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for leaving the sick, the number of whom had increased to seven, and for obtaining provisions for the rest of the journey. Owing to the great facilities afforded me by Captain Enos, I was enabled to conclude my preparations that evening, so that it would not be necessary to detain the wagon on the following day for more than one or two hours.

The thermometer has been all day seven degrees below *zero*; and I was told that, for several days previous, the temperature of the air had been of the same degree of coldness.

January 20.—This morning was bitter cold, although there was no wind. At eleven o'clock, my party arrived. We at once commenced crossing the Arkansas river. To do this, we were obliged to carry sand and spread it over the slippery ice on the route we had selected. Although the ice was generally eight inches thick, yet in one place, for the breadth of six feet, the rapid current was running clear; this circumstance increased the difficulty of crossing.

As soon as we reached the fort, the sick were carried into a comfortable room, where they were to remain until next spring, when they might return to the United States. Our axes and tools were sharpened, our wagons examined, and we took the precaution to obtain an extra axletree. In two hours we were again on the march, and at evening formed our camp six miles to the eastward of the fort.

My friends at Bent's Fort cautioned me with regard to the want of grass on the burnt prairies between Pawnee Fork and Council Grove. I therefore determined to save my corn until we should reach the burnt prairies, and until then permitting the animals to run loose.

We had already used eight of the fourteen fanegas, which we had obtained at "Las Vegas."

January 21.—The sun was half an hour high before we left camp: we had an excellent road, it was smooth and very hard, wherefore, although we moved at an easy gait, we reached the "Big Timbers," and encamped an hour before sunset. Not far from our camp, there are the ruins of some old trading houses. Here were some immense cotton wood trees, which were already felled; with them we built roaring fires. We were now twenty-seven miles from Bent's Fort, and had sped our way so pleasantly, that we conceived brilliant hopes of our future progress.

January 22.—We soon came in sight of the Cheyenne lodges. The Indians had all gathered here, where they might have shelter from the storms of winter. Thoughout our day's journey, we saw their lodges lining the banks and covering the islands of the river.

The "Big Timbers" afford an endless supply of wood, and on the plains, on the south side of the river, the grass is very good, while the unfailing waters of the Arkansas, in addition to the requisites already mentioned, make this spot one of the most eligible for the erection of a military depot, in case the government intends to maintain its intercourse with New Mexico.

We met a white trader amongst the Cheyennes, who warned us

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against the Arrapahoes, who, he said, were daily coming in with herds of cattle and numbers of Mexican scalps.

About sunset, as we were travelling slowly along the banks of the river, an Indian approached us, making signs to have us encamp; he said that he had a large supply of dried Buffalo meat, and he could bring it to us if we would encamp near his village. In the evening a number of squaws came to our camp, bringing the promised meat. Although we paid them well with such trinkets as we possessed, yet they could not have been perfectly contended, for we found, after their departure, that they had carried off all our axes, together with two guns and a bullet pouch. These thefts occurred after my men had been warned to be upon their guard; certainly, no people can be more skillful in thieving than the Cheyennes.

January 23.—This morning, as soon as we arose, we saw the Indians returning. In front came the chief of the village, and as soon as he was near enough, we saw that he carried some of the stolen articles. The squaws brought more meat, but I refused to take any of it until all the missing articles were restored. The chief told me that if I would go up to the village with him, he would get them; the village was two miles distant, but rather than loose our axes I consented to go. As soon as we approached the lodges the chief commenced haranguing his people in a stentorian voice, and then invited me into his lodge. In a little while the Indians came running to us, and every article was restored.

Shortly after leaving camp we met a company of men who had been sent from Bent's Fort, with a wagon load of corn, to meet Captain Murphy at the crossing of the Arkansas; impeded by heavy snows, they had only succeeded in getting thus far on their return to the fort.

At sundown we reached a spot where the river bottoms were all burnt; no wood was to be had. We crossed over to an island which was covered with willow bushes; here we were pretty well sheltered, but the willow brush was so light and consumed so rapidly that we found not much comfort by our camp fires. At the mouth of "Big Sand creek," I obtained a very curious fossil, supposed to be an inoceramus.

January 24.—On account of the prairies having been burnt, our mules wandered off for five or six miles. We did not get away until eleven o'clock. Thus we were obliged to lose the best part of this day, on account of the inexcusable negligence of some preceding travellers who had not extinguished their camp fires.

After the first three miles, our road became extremely difficult. We had to march through snow which had laid on the ground some time. It had thawed, and had afterwards frozen, sometimes bearing up the wagons and mules; sometimes giving way so as to render our progress slow and difficult.

To-day we saw some buffaloes. I sent out some of the men to kill one of them, but they were very shy, and the snow upon the ground prevents one from approaching without being perceived. Having marched 22 miles, we reached "Little Sand creek." We

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crossed over to an island, where there was plenty of fine timber. We also found here several Indian wigwams, which had been made of brush and covered with grass that had been cut in the summer. This grass was just what we could have wished for our mules, and there was enough of it to have sufficed them for a week. In the evening we saw a fine "bald-headed eagle." It lit upon a neighboring island, which could not be approached without wading through an open space in the river, or else I should have sacrificed its life to obtain its skin.

January 25.—Some of our mules got off of the island during the night, but we caught them again without much difficulty. Soon after starting we met an Indian travelling along the road on foot. I asked him if he was a Chyenne; he answered with a nod, and went on.

At two o'clock, after a hard drive of 16 miles through snow, we encamped under the shelter of some cotton wood trees which grew near a dry creek.

Our present location had been lately occupied by Indians. On every side were to be seen circular spaces, which had been covered by their lodges, and the pieces of bark that they had placed under their beds.

One Indian came to our camp. As he said, the village was near, I sent one of my men to it, who purchased some winter mocasins. These are made of buffalo robe, with the hair side in; by inveloping the feet with slips of blanket, and putting on these moccasins, we were able to keep comfortably warm.

January 26.—We had a bad start this morning. In passing through a deep snow-drift, one of our mules, not being able to extricate its feet, was thrown across the tongue of the wagon. There was a hard crust on the snow, which, breaking through beneath the wheels of our wagons, impeded us very much. The air was exceedingly cold, and the wagon wheels made a noise in the frosty snow like the screaming of a large flock of blackbirds. Our mules had a terrible time of it; where the crust on the snow bore them up, their feet were slipping about and wrenching their limbs violently, and when it broke through, they were plunging up to their knees, and scraping their legs against the sharp crust. They were soon smoking with sweat, and puffing and blowing with the violence of their exertions; every little while we were obliged to stop. But our difficulties decreased somewhat towards the latter part of the day, and we succeeded in making a march of fourteen miles, when we found a good camping place, with plenty of wood, and on the islands in the Arkansas, as there was good grass for our animals.

January 27.—As the day was very cold, and the deep snow gave us a great deal of trouble, we were not able to accomplish more than nine miles of our journey. We encamped near the spot where one C. P. Gibson had been buried. A piece of board, bearing the name of the deceased, and dated January 1, 1847, points out to the traveller the resting place of this poor man, whose death adds one more to the many which have occurred upon the prairies

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within the last eight months. The ravenous wolves had already been at work on the grave, but the frozen ground had proved too much for them.

Near sundown an Arapahoe chief arrived, named by the whites "Long Beard." He paid me a visit, and in the evening I went to return the compliment. His lodge was the most luxurious habitation I had seen for a long time; there was no place where the cold winds could find entrance, and a few pieces of bark in the middle of the lodge kept it perfectly warm. "Long Beard," finding out that I belonged to the "soldiers," produced a gilded epaulette which had been presented to him at Bent's Fort; he also showed me a scrip of paper, signed by Mr. Wm. Bent, which paper mentioned "Long Beard" in the highest terms of commendation.

This chief spoke a great many Spanish words, which enabled him to make himself understood. He told us the snow was so deep that our mules could only nip the heads of the tallest grass, and begged us not to attempt to proceed, as there was no grass and no buffaloes in the direction we were going, and that the scarcity of the necessaries of life had forced him to leave that portion of the country, where his children and his horses had been starving for some time past, and that he was now in search of meat for his people and grass for his animals. While we were here we saw the squaws kill a fat puppy, and having singed the hair, they put it into the pot for supper. Dogs are considered a "bon bouche," only to be served on festal occasions, but rather than starve, poor "Long Beard" was obliged to be thus extravagant. It was well he kept his fat dogs under his eye, or some of my party might have been tempted to commit similar extravagances.

This evening we had some target shooting; although it was very windy, there were some excellent shots made.

January 28.—The sun now burst forth with some power, and, assisted by a western wind, caused the snow to thaw rapidly.

We made a march of twelve miles and encamped near a grove of cotton wood trees, and not far from a village of Cheyennes. The Indians immediately flocked round us in great numbers; they said that they had had nothing to eat for three days, as the snow that covered the country had driven the buffalo off to find pasture grounds.

Many of them offered me presents, hoping that I would give provisions in return, but I could not receive their presents, as I had no provisions to spare. They then begged me to give them whiskey, and annoyed us with their pertinacity, so that I would have driven out of camp, had I not been obliged to let my mules run loose all night, which circumstance they would have profited by to retaliate if we had given these people any offence.

January 29.—As we were preparing to depart, the Cheyennes gathered around us in great numbers. One of the principal men brought his whole family, which consisted of his wife, four or five sons and as many daughters, and desired me to give them something to eat. He said that they had been without any meat for the last three days. As all our provisions were packed away, I refused

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to give him food, and, after he had left us, we found that he had carried off a powder horn and bullet pouch belonging to one of the men.

We had hard work all day, as the snow was deep. When we came to cross the ravines and beds of streams that unite with the Arkansas, we found that all the snow had drifted to the eastern bank, which we were obliged to ascend. These drifts were from five to six feet or more in depth; the mules sunk to their bellies and struggled through with great difficulty; the wagons sunk until their "beds" rested on the surface of the snow; still we crossed these places, although they were sometimes thirty or forty feet wide; and in the face of these difficulties we made a march of thirteen miles.

When we encamped, we were again obliged to suffer for the unpardonable negligence of persons who preceded us, for the prairies, for miles around, had been laid waste by fire. Fortunately, the ice was in such a state that we could cross to the opposite side, and to the islands; but we were obliged to work hard, in covering the ice with sand, so as to make a path for our mules. We found plenty of wood on the islands. It had been brought there by the river.

January 30.—Yesterday, the road was so covered with snow that we were obliged to guide our course by the river; but, this morning, we again found the road. It was, however, with great difficulty that we managed to keep in it. Although the sun shone, and the snow thawed very much, still our progress was difficult. It required the greatest perseverance to accomplish eleven miles. We encamped in a bottom of tall swamp grass; here we found some old wagons; we were obliged to burn them, for the river was in such a state that we could not cross upon the ice.

One of my men told me of a method of catching buffalo that I do not recollect to have ever heard; he says that the Ricarees make piles of buffalo dung so as to look like men, and arrange these piles in two lines which, gradually approaching, lead to a pen. Having driven the buffaloes between these two lines, the animals run on, without daring to cross these lines, and are caught.

January 31.—We have another day of brilliant sunshine; indeed, it seemed hot. The snow began to melt away rapidly.

After a march of five miles, we met Mr. Sublette who was travelling with important letters to Santa Fé. Soon afterwards, we met a train of six wagons belonging to Messrs. Bullard & Hook, of Missouri. It had been to the crossing of the Arkansas to raise some "caches," which some of the proprietors of this train had been obliged to make early in the fall.

We now received news of the conquest of Monterey, and we also heard that our forces were being concentrated at Tampico, preparatory to marching upon the city of Mexico.

Shortly after passing these people, we encountered some wolves following their trail. So intent were the wolves in their employment that they came quite close to us, holding their heads near the ground as they scented the tracks of the men, when one of my party levelled his rifle and killed the foremost. These animals have be-

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come very daring; one of our mules came into camp this morning with its fore-leg badly bitten by them, and covered with clots of blood.

After a march of twelve miles we encamped near the fort which those men who were attacked last fall by the Pawnees had built, to protect themselves while they sent to Bent's Fort for assistance.

February 1.—The sun shone forth with warmth, and the melted snow made the ground quite muddy. After proceeding five miles we passed the "Arkansas crossing." We marched all day without seeing any good places to encamp. At length our mules became so worn out that we could scarce go any further, nor was the prospect of finding wood on this side of the river any better in advance of us.

One of the men had just killed a fine buffalo; I sent out a mule to bring in the meat, and we encamped. The river was in such a state that no one could cross without wading a good portion of the way, although the ice was in many places six inches in thickness.

The wind had been fair all day; it suddenly changed to the north, and began to blow with great violence, while dark clouds seemed in an instant to cover the sky.

I now saw it would be an eventful night for us. Our fires were blown out by the tremendous violence of the wind, and we were forced to get into our beds and there abide the fury of the storm.

February 2.—All night the storm raged with a fury as awful as that of the "tormentes" of Mt. Blanc. The particles of snow beat with wild rage against my tent, while the frail structure quivered, and the poles that supported it creaked and groaned so much that it was impossible for me to sleep. Such was the force of the wind, that it drove the snow through the canvass walls of my tent, and I found my bed and papers covered with it. During the night I heard one of the men, who had got his feet wet in attempting to cross the river, imploring some of his companions to let him get into the wagon with them. The night was terribly cold, and I feared that all of our animals would be frozen to death before morning. At length morning came, but when I looked out the snow was drifting along in dense clouds of hard icy particles, that flew along with the velocity of lightning. As the sun began to appear the storm ceased, and it was most fortunate for us that it did cease. I now forced my way out of the tent, which was banked with snow. When I looked around, a scene of utter desolation presented itself; most of my men had lain down on the ground to sleep, but now not one of them could be seen. I called aloud; they heard me not, being covered beneath the deep snow. I now went to the wagons; in one I found Pilka and Laing; in the other, two or three men, one of whom had been very ill ever since leaving Bent's Fort. He came rushing towards me half distracted, his shirt covered with snow, his head bare, and crouching at my feet, he implored me to take him to a house. "O, Lieutenant, take me to a house! I shall freeze to death! I'm freezing! I'm freezing!" His arms were drawn up and stiffened, his body almost paralyzed with cold. I took the poor fellow and put him in my

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own bed, and covered him with blankets and buffalo robes; it was all I could do.

We now searched about and found the men by the aid of the cracks on the surface of the snow, caused by the movements of the restless sleepers; covered by the heavy mantle of snow they had kept extremely warm, and now the chill air felt to them more intolerable.

We managed to find a few pieces of wood that we had collected last night; the wind still blew so fiercely that we could not kindle any fire out doors; we succeeded in lighting some pieces of wood in the tent and then built our little fire on the leeside of the wagon; the men crouched around silent and shivering; I now called on two of my men to come with me, they were two of my best men; they had been hardened to peril in the service of the fur companies; men who would not flinch under the most fearful vicissitudes; they readily accompanied me, and we started down the river in search of some spot which would furnish us with fuel and shelter; we proceeded down the river some distance, but seeing no timber on this side, we crossed the river upon the ice, which was now sufficiently strong to bear us up; we built an enormous pile of logs and set them in a blaze, and I sat down to dry my moccasins and leggins, for I had broken through the ice while crossing a treacherous spot in the river.

My men were now sent back to collect all the property and to harness up the mules, and move down to a spot directly opposite the timber; many of them left their bedding, clothes, and guns buried beneath the snow, and, half crazed with their forlorn and weather beaten condition, hurried down to seek shelter.

At length the wagons arrived and we endeavored to drive the mules to the south side of the river, where they would have good pasture grounds; some, however, took fright (when half-way over) and rushed back, and one broke through the ice; we immediately passed ropes under the belly of the animal and soon drew it out of the river; to keep its blood in circulation we dragged it backwards and forwards; all would not do, its limbs became momentarily more and more stiff, and at last the poor beast fell to the ground; we put three buffaloes robes upon it and left it.

My men now reported the full extent of our misfortunes; three of the mules were found frozen to death, and half hidden by the snow that had drifted upon their dead bodies; around this heap the other mules were gathered, to screen them from the storm, and the "laryettoes" of the living were entangled about the dead. It is more than probable that all of them would have met with the same fate, had the storm endured twelve hours longer; our mules were now driven to a spot about one mile below us covered with willows and swamp grass.

We built our fires on the southern bank of the river, in the bed of a dry creek, the banks of which afforded shelter from the wind; the night was clear and excessively cold; we were all obliged to sleep without tents, as the ground was frozen so hard that tent pins

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could not be driven, and when we had softened the soil by building fires, the sand became too loose to hold the pins.

February 3.—This morning we arose at an early hour; packing up our camp furniture, we recrossed the river and marched a mile further down the Arkansas.

The mule that we had drawn out of the river had recovered sufficiently to regain its feet; some corn was given to it; but during the past night it had wandered off a few yards and was attacked by wolves, and devoured while endeavoring to regain the wagons; the saddle blanket that I had girted around it was torn to pieces. Poor mule! it met a cruel death after going through so many troubles; it was the last one of the set with which I left Bent's Fort on the 9th of last September.

To-day Brown was struck blind, from the effects of the glaring light reflected by the snow. We left him in camp until the afternoon, when I sent some men to gather up his clothing and lead him into our new camp.

Those who had left their property at the camp when the storm occurred, took spades and went and dug it out.

The men in camp overhauled the provisions and the bedding; although our wagons had each two covers, or sheets, they were full of snow.

On a fallen tree, against which we built our fires, we read that which follows: "J. Abrea, Y. Litsendorfer, C. Estis, March 11, 1846." "A storm." This gave us new encouragement, for we felt that other men, under the same circumstances, and in the same place, had felt, suffered, and thought as we had, and we felt that we, like they, could weather the storm.

In the evening, some of the men led Brown into camp. He said, that while lying near our old camp fires, listening to the bickering of the ravens and magpies, which were contending for the scraps we had left, he felt something give his buffalo robe a jerk, and looking round, he saw several wolves; they ran off a few steps, seeming to have but little fear of him; his eyes pained him so much that he did not attempt to shoot.

February 4.—We again started at our usual time, and in good order, leaving many articles which only served to encumber us. As our "mulada" was now weakened by the loss of the four frozen mules, our progress was slower than heretofore.

During the first few hours, it was with difficulty that we could keep the road, which was covered with deep snow; in many places it was a foot deep, although, now and then, we found little spots on the road that were perfectly bare, and in the river bottoms there was but little snow. At midday the sun shone forth with warmth, the snow began to thaw, and our progress became comparatively easy. We marched fifteen miles, and camped near a fine grove, where we found some dry wood and pretty good grass; although the buffalo, which had recently been here in great numbers, had much impaired the grazing.

The greatest inconvenience that we have suffered on this march has been caused by the negligence of others with regard to the

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camp fires; which negligence having caused the destruction of the pasture grounds, our mules would wander off, and we frequently lost much of the day in catching them. It is no wonder that the Indian looks with hatred upon the whites, who go about spreading desolation, by their shameful waste of pasture grounds which the Great Being has planted. This winter the buffalo have almost deserted the river, because there is no grass for them; and the Indian, forced by the inclemencies of the season to seek shelter in the timber, which grows only on the banks of the river, must now travel a long way from his village before he can obtain meat enough for his subsistence. There should be some measures taken to protect the prairies from being set on fire.

February 5.—We had scarcely left camp, when the wolves and ravens clustered around the smoking embers of our camp fires. During the day Laing killed a wolf, and he also killed a badger, "taxus labradoricus." Continuing our march, we passed beyond the point where the road turns off which goes direct to Pawnee Fork, and passing three miles beyond Jackson's grove, encamped in the open prairie.

For fuel, we used the "bois de vache," and the pools of melted snow near our camp supplied us with water. In the evening we twice heard the report of a gun; but, as we had noticed during the day fresh signs of wagons and oxen, we supposed we had overtaken a party of teamsters who had gone on from Bent's Fort, and who had taken the direct road to Pawnee Fork.

February 6.—This morning when we arose, the buffalo were numerous all around our camp. We began to get every thing ready for the march, and sent off the guard for the mules; it returned without them, and reported that not one of our animals could be found. I now sent Pilka; in a few hours he returned, and reported that the Indians had carried off our mules; he had found their trail, which led off to the north. This trail was perfectly straight; there were no signs of any mule having turned aside to crop the tempting grass, through which their course sometimes led. We no longer doubted that the mules had been carried off by the Indians. I questioned the guard, and learned that the mules had run into camp as the day was dawning, but they were driven out again, as they were tearing the wagon covers with their teeth, and destroying every thing they could get hold of. Had the guard been used to travel among Indians, the conduct of the mules would have caused them to have caught them, and to have secured them to the wagons.

What were we to do? To pursue the Indians on foot was vain. We were now left with our wagons containing our bedding and provisions, and a sick man who had not been able to walk for the last week. What now was to be done with all the geological and mineralogical specimens, and the collection of objects of natural history, which had been obtained in New Mexico? I thought of "caching" every thing, and walking into the States; but what was to be done with the sick man? Some of my men proposed leaving him with the provisions, to abide his chance on the prairie; "for," said they, "must we all die for this one man; is it not better that

one should die?" But I determined not to leave the poor fellow, without certain provision for his safety. We were off from the usually travelled road; it was necessary that we should return to it. Once I thought of remaining until I could receive mules from Fort Leavenworth, but in bringing them to me they would again be liable to be stolen by the Indians.

Near our camp we found two broken down oxen. We hitched them to one of the wagons, and with the help of the men we moved to a spot that would be easily defended, and where we would be sheltered from any storm that might come.

February 7.—I now determined to proceed at any rate, depending on the resources which yet remained to me, without involving myself with new uncertainties.

I again sent out a party to reconnoitre the country, wishing "to make assurance doubly sure." It was hard to believe that our evil stars had been so dominant; not a trace of the lost mules could be seen, for the little spots of snow which yesterday bore their vestiges had to-day melted away.

But nothing annoyed me more than the idea of losing my various specimens, which had already cost so much time, labor, and anxiety.

At last I determined to destroy one of the wagons, and to throw away everything that we could possibly dispense with, and then to put ourselves into the traces and drag the lightest wagon as far as Pawnee fork; there I should leave the sick man, with some persons to take care of him, and the rest of the party would pack their provisions and bedding on their backs, and start for the settlements.

February 8.—We begun our preparations; the warm clothing that we had brought to protect us from the rigors of winter was thrown away. The men destroyed their buffalo robes, retaining only one for every two men of the party. I parted my wardrobe amongst my men, and no one reserved any apparel, except that which he had on his back; everything was now disposed of except our powder and lead and our provisions.

We now drove up the two steers which fortune had thrown in our way; we fed them bountifully with the corn we had treasured up so carefully. Having found that the oxen could not work in mule harness, we manufactured a yoke, by driving into a bar two pieces of wood; these pieces were in pairs and had holes in the ends, so that cords being passed through the holes, they were tied under the throats of the oxen. A long rope was attached to the tongue of the wagon, and the men formed loops of ropes or bricoles which they passed over their shoulders, and then attached at intervals to a long rope which was fastened to the end of the tongue.

We now started amid the loud exulting cheers of the men, as they thus triumphed over our difficulties, when we seemed to have reached the "ne plus ultra" of misfortune. To have seen us, one would have thought that we were on some lively frolic, whereas we had undertaken to haul a loaded wagon from Jackson's grove to Pawnee fork, which is a distance of 64 miles by the river route, the one which we pursued.

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We marched a distance of 13 miles, and at night were obliged to encamp in the open prairie. Our fires of "bois de vache" served well enough to boil our coffee, but very little heat was to be obtained from the burning of this kind of fuel.

February 9.—To-day we marched fifteen miles; a slight rain that fell last night made our progress more difficult than that of yesterday. Just as the sun was setting, and while I was searching out a fit place for our little camp to halt for the night, I looked back and saw a dense group of men suddenly rise up from behind the river bank, where they had been secreted; they now spread out to disply their numerical strength; they had a little flag displayed in token of amity, and they made signs to us that they wished to approach. We now permitted two of them to come forward, and I went out with Laing to meet them. They offered us the hand, telling us that they were Pawnees, striking their breasts and crying out Pâwnye! Pâwnye! The one who styled himself the "captain" asked why we were pulling the wagon, and wanted to know if all our oxen had died; and added, that if we wished he would furnish us with mules, for he had a great number on the opposite side of the river. He said that if I would encamp now, that in the morning he would bring some of his mules across the river. As amicable relations were now established, he signed for his party to approach, and we went on to the wagon. Finding that the Indians were mingling amongst my men, I told the chief in a loud tone to order them to keep away; they instantly obeyed him. We now encamped; all the Indians crossed the river except the chief and five others. I invited the chief to stay with me all night; he consented, but still retained his five attendants. I told him that they must not stir about at night, for my guards were always on the watch for thievish Indians, and they might be shot by mistake.

At night they all crowded into my tent, and slept coiled up in a little space scarce roomy enough for me alone.

February 10.—The morning was extremely cold and threatening, clouds were flying rapidly across the sky. Our Indian friends, as soon as they looked out, raised their hands high above their heads, and, permitting them to hang loosely from the wrist, shook them as one shakes water from the tips of his fingers, and then they would touch some white object; by these signs they meant that "white rain" would fall when the sun was at such a position in his path, which position they indicated to us. They asked my permission to go to their own lodge until the snow storm should have passed, and they begged me to accompany them. I determined to go, although the ice was not strong enough to bear a man's weight; but I suspected that these very Indians had stolen our mules. Accompanied by the six Indians, I started across the river. A strong north wind was blowing on our backs; this helped us along, for we were obliged to keep our feet wide apart, in the position of those of a person who is sliding on the ice; but, nevertheless, we all broke through constantly, and where the current was deep and rapid we were forced to wade. The air was freezing cold, and as soon as we reached the southern bank of the river, we set

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off in a hard run to keep our wet clothing from freezing our limbs. The Indians were not less wet than myself, for they had tied their leggins close around their ancles to protect their legs from being injured when the ice broke through. After a run of a quarter of a mile, we arrived at the Indian lodges. The chief called three of his party, who took my socks and leggins and moccasins; with little sticks they beat off the ice; they wrung the water out of my clothes, and dried them by the fire. In the meanwhile I was obliged to sit with as little clothing on as ever any Indian wore. The Indians soon fixed a place for me to sit. In a short time they cooked some buffaio meat, and gave me the largest share of fat and of lean, which they placed on a flat stone in fault of a plate.

Feigning after a while that I wanted to re-cross the river, I stepped out to reconnoitre. The snow storm had caused the Indians to collect their mules in the little gorges which abound among the sand hills that are found on this side of the Arkansas; the mules were also covered with skins of wolves and buffaloes to protect them. I could not see any thing of the mules I had lost. The snow storm now raged fiercely, and I returned to the camp of the Indians, telling them that the storm raged too furiously for me to cross the river. We laid down to sleep, which was now and then interrupted by the entrance of some of the Indian sentinels, who reported every change in the weather, or any movement among the buffalo; although the latter were very numerous, still these Indians were almost without food; and while I was with them some of the subordinates came to dance the "beggar's dance" before the chief's lodge. I asked him what the dancers meant, and was told that they wanted something to eat. The chief then gave them some buffalo meat. This confirmed me in the suspicion that these fellows had stolen our mules. It was now evident that they were here for some mischievous purpose, and would not fire at the buffalo for fear passers-by should hear their guns, and track them to their lair. I asked them why they did not kill buffalo. They answered, without hesitancy, that their guns might notify parties of Cheyennes, which were continually making "war paths" through their country. I asked them what they were doing here on the Arkansas. They said that there was no grass towards the northern region where they lived, and that they had brought their mules here to graze; but, be it known that they were without their women and children, and without lodges, not travelling like a peaceful grazing party, but prepared for war and robbery.

In the evening the storm cleared away; and, with the polite guidance of the Indians, I managed to cross the river without breaking the ice, which was still weak, although much stronger than it was this morning.

My men had lain abed all day, in order to keep warm, for there was no wood to be had on this side of the river with which to build fires. I told them that they could get plenty of wood on the opposite side; but they broke through the ice, and were obliged to return; we were fain to use "buffalo chips."

February 11.—This morning my men arose early and crossed the

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river without trouble, where they got plenty of wood; the snow storm we had yesterday, and the discomfiture produced by the hard labor of hauling the wagon, had put them in no very pleasant humor. They wished that I would let them kill the Indians as soon as they came across the river; the Indians came; they entered our camp, and seemed instantly to perceive the feeling that was burning in the hearts of my party; they stood off without daring to approach our fires; there was but six or eight with the chief now, but he approached at last and offered his hand, and immediately the confidence of the rest seemed to be restored.

In my own mind, I did not doubt but that these fellows had robbed us; still I could never kill any of them in cold blood, nor would I consent that my men should shoot them down.

We told them to bring over some of their mules; they brought two, but refused to let us have them, unless we gave them much more than they usually get in fair trade.

We had left our harness near Jackson's grove; the mules could not then be attached to the wagons; and, as to buying a mule for myself, which my men insisted upon my doing, I felt perfectly willing to share the hardships of my party, and unwilling to countenance what I considered an imposition on the part of the Indians.

The Indians left us in high irritation, on account of the trouble they had had to get their mules across the river; they immediately recrossed, and we prepared to take up our line of march. We now found that an axe which had been lent to the Pawnees, with which to roughen the ice, had not been returned; the Indians stood gazing at us from the opposite bank, while their mules, scattered along the river side, were quietly grazing. I called the men together; and, leaving two of them in charge of the wagon and sick man, the rest of us started off in pursuit of the Indians, who no sooner saw this movement than they hastily gathered their mules and set off for the sand hills. To pursue these fellows was evidently vain, and we were forced to give up our axe, and again put ourselves into the traces.

We marched twelve miles. During the first half of our journey, some of the Pawnees continued to dog our trail.

The language of the Pawnees bears a great resemblance to that of the Ricarees. I had a person in my party who once traded with the last mentioned tribe. He recognized many of the words that the Pawnees used. Our communications were, however, carried on by the means of the pantomimic language, a knowledge of which is of very great value, as the various signs seem to be universally adopted as typical of the same things among all the prairie Indians.

February 12.—Notwithstanding the snow storm of the 10th, the ground was almost entirely free from snow, except in the ravines and beds of creeks where it was not exposed to the wind. The sun shone forth with great vigor, and we marched more rapidly than we had done on any preceding day. At ten o'clock we crossed the mouth of "Coon creek," and about five o'clock we formed our

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camp on the banks of the "Pawnee fork." This day we marched more than twenty-one miles. On the road we found two more steers. With them we replaced those which we had started with in the morning, and which were almost exhausted. When we first came in sight of the timber on "Pawnee fork," my chief anxiety was to keep my men from laboring too severely; the wagon ran along at the rate of three miles an hour, and I was obliged to walk rapidly in order to keep out of the way.

My whole party had done their duty bravely; in the most literal sense, we had worked like horses. I could not ask my men to do more. Should a heavy fall of snow come it would be impossible to proceed with the wagon. I, therefore, determined to give each one as much provision as he would choose to carry on our coming pedestrian excursion to the settlements. We had now between 280 and 300 miles to march. We determined to accomplish this journey in twenty days.

Two of my men, Brown and Preston, agreed to stay with the sick man. They were now on the high road, where they would see every one who passed, and would have, before a great while, an opportunity of joining the return party, which was preparing to leave Santa Fé when my command set out. While here they would have everything they could wish. There was an abundant supply of timber, a never failing stream of good water, and we would be obliged to leave a large quantity of provisions, as no one would care to load his own back for the gratification of his stomach.

February 13.—We now set earnestly to work, making our packs of provisions and bedding as light and compact as possible. We baked all the bread we intended to carry. Each one provided himself with 20 biscuit or rolls, one for each day. We also took a few pounds of dried buffalo meat, which is light and compact, but swells up in boiling water. We each had a tin cup, which would, on an emergency, answer for a coffee pot. We, therefore, added the luxuries of coffee and sugar. As for bedding, a buffalo robe and a blanket were all that any one would be willing to carry three hundred miles, when he recollects the additional weight of his provisions. But I adopted a plan which made my blanket worth two. I had it sewed so as to form a bag. This, trifling as it may seem, greatly augmented my comfort.

We were all of us very careful to dry our clothing before going to bed; no one who observes this precaution, and who is provided with a buffalo robe, need ever get frozen.

February 14.—I still found means to carry my New Mexican specimens further on. My books and some of my papers were put into a box and "cached;" for greater safety the spot was fixed so as to resemble a grave, and a tombstone of board was erected to mark the spot, and engraved with the name of "Tom Poco," who with "Tom Bien" were, according to some of my men, the most famous persons in New Mexico; perhaps these persons originated only in their metamorphoses of the words "tampoco" and "tambien."

The most valuable box was lashed to the fore axle of the wagon;

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we attached the two oxen to the tongue and started. After a march of seven miles we reached "Ash creek" and there encamped.

I now resolved to let some of my men go on as rapidly as they could, and get mules at West Port, Mo., with which they could meet me at Council grove. I therefore sent for Pilka, Dobson, and Wiseman, and having given them all necessary letters, they prepared to set off by sunrise the next morning.

February 15.—To-day the sky was cloudy, and threatened us with a storm; the air was very cold. After marching six miles we reached "Pawnee rock;" here we stopped a few minutes and kindled a fire; again continuing our route, we marched sixteen miles further, and encamped on Walnut creek. Here we overtook the express party, and we had a hearty laugh at our having overtaken them; but Pilka was a good woodsman, and would not leave the timber when the sky looked so threatening, otherwise they would have gone on, and have slept in the open prairie.

February 16.—Just as we were about starting this morning, a fine mule came trotting into camp. We tried to catch it, but it had become so wild that it would not let us approach sufficiently near. This mule had a blind bridle on its head, the rein hung dangling upon the ground. As soon as we crossed Walnut creek, we came in sight of herds of buffalo. These animals were continually running across our road as we advanced. Sometimes they would stop just in the road a few hundred yards in front of us, and kneeling down, toss the dust into the air with their horns, or else take a roll over on their backs, then springing up, dash off again with their long beards and manes waving in the wind.

After a march of fourteen miles we encamped at "Plum buttes." We got water from some neighboring pools, and the plum bushes answered for fuel.

In the afternoon a band of buffaloes started for the river; they came directly towards our camp; we all secreted ourselves in the bushes at the top of the butte. We had "the wind" of the buffalo, and they came on without discovering us; they walked slowly along; having suffered the old bulls to pass on, we selected a fine buffalo and fired down upon him; he only ran a short distance before he laid himself down. We approached warily, for we were all on foot, and fired a second gun, which caused the buffalo to lay flat upon his side. We were instantly upon him with our knives and tomahawks. Laing gave a mortal wound to a fine fat cow, but as she would get up and walk off every time he tried to approach, and as night was drawing on us apace, he deemed it more prudent to leave his victim to the wolves than risk the loss of his own life by Indians.

We cut out all the marrow bones and all the choice pieces, and spent the best part of the night in cooking and eating, and during the night the wolves eat up everything we had left.

We would have been very glad if we could have carried some of this meat with us, but our packs felt heavy enough without any addition.

February 17.—I had intended to march to Chavez creek, about

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19 miles distant, but the poor fellows who were with me complained so much of the soreness of their feet, that I determined to encamp at "Cow creek," which is only 11 miles from "Plum butte." Here we found a good ox-yoke, a thing we greatly needed. There was also a wagon and several muskets, which must have been left by the party of teamsters who had preceded us. It was evident that the express I had sent on had encamped here last night; their fires were still burning.

About 2 o'clock we saw some persons approaching; they proved to be Mr. Miller and Mr. Hoffman, of Baltimore. They were nearly out of provisions, and their mules almost broken down. From them we learnt everything with reference to the fiendish massacre that had been perpetrated at "Taos." Nothing I had undergone had caused me more unpleasant sensations than the news of the horrid massacre of Governor Bent and his compatriots.

I had been acquainted with Governor Bent ever since my first arrival in New Mexico. I esteemed and admired him greatly, and every one in that country looked upon Charles Bent as one in a thousand.

When the fiends were breaking through the roof of his house, even after he had been wounded, his wife brought him his arms, and told him to fight, to avenge himself; he could easily have killed some of the mob, who were entirely exposed to his aim, from the hole they were making.

"No," said he, "I will not kill any one of them, for the sake of you, my wife, and of you, my children. At present, my death is all these people wish." The murderers rush in, they kill him, they scalp him, and, horrible to relate, they parade the bloody scalp through the streets of "Taos."

Mr. Hoffman and his party continued their journey. In a little while afterwards we descried another body of men approaching; they proved to be a party under the command of Mr. James Brown; he had kindly picked up the men whom I had left at Pawnee Fork, and had also raised my "cache," which he had brought along for me. Mr. Brown agreed to carry the baggage belonging to my men, and we now felt as if all our troubles were ended.

February 18.—We were up before the sun rose, and in a few minutes commenced our march. In the evening we encamped on the "Little Arkansas," which is 20 miles distant from our point of departure this morning. We had started with the intention of marching 10 miles further, but this evening it looked stormy and threatening, so we determined to encamp in the timber of the Little Arkansas.

February 19.—This morning, before we had proceeded more than 5 miles, we met J. Dobson, whom I had sent on the express; he told me that there was a team belonging to the government at "Cotton Wood fork," in charge of the wagon master, Mr. Smith, who said that he would carry every thing that I had on to Fort Leavenworth; fearing a storm he had set out to reach "Cotton Wood fork," where he would await my arrival. We encamped in

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the evening at "Turkey creek," here there is no wood to be found and besides this, all the grass around us had been burnt up.

February 20.—Last night we had an awful storm, it still continued. Several mules have been frozen to death. We have been obliged to lay abed all day, in order to keep warm. The snow is still drifting about furiously.

February 21 —This morning is the first time for thirty-six hours that any one has ventured out of bed. My men had their provisions ready cooked, and shared them with Mr. Brown's party; of all the tents that had been pitched Friday night, mine was the only one which still remained. The snow had heaped up around the rest so that the inmates were obliged to desert them, and take refuge in the wagons. About mine, the wind had swept in such a way as to keep open a path around it, although the snow was on a level with the ridge pole of the tent. We now broke up some boards that were in the wagons, and kindled a little fire. Soon the sun rose; but, instead of one sun, we had three; all seemed of equal brilliancy, but, as they continued to rise, the middle one only retained its circular form, while the others shot into huge columns of fire, which blended with the air near their summits. The breadth of the columns was that of the sun's apparent diameter, and their height about twelve times the same diameter; they were between twenty and thirty degrees distant from the sun. Before the sun had risen more than ten degrees, this phenomena entirely disappeared. Some of the men called my attention to this strange appearance, but so engrossed were they with their own calamities, that they hardly seemed to be in the least astonished at what they saw.

After some little while we missed Preston and the sick man; we inquired, but no one knew anything about them. It was now evident that they had been buried beneath the snow drift, which, for some distance around had filled up the nook in which we had encamped to the level of the prairie; as the drift was of considerable extent, much time would be wasted in examining it, unless we could find where they had pitched their tent. At last, I noticed one poor fellow digging away to find his boots; he showed me where the sick man had been. I called the men, and immediately set to work. The snow was six feet deep, and we had only a little piece of board to dig with, and the cold was so great that no one could work very long before his hands became perfectly rigid. After a good deal of hard digging, we found a pair of boots, which were recognized by the men as Preston's property. This urged us to renewed exertions; at length we cleared the snow from a portion of his buffalo robe, and lifting it up, we got sight of the poor fellow's face; he cried out in a weak voice, begging us for God's sake not to leave him to die. We assured him that we would not forsake him, and again covered his face until we could remove more of the snow; having dug as far as his waist, five men caught hold of him to drag him out, but the snow had been moist and was packed very hard, and he was held tight by the tent which had been broken down by the pressure of the snow; however, we dug

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a little more until we could get at the ridge pole of the tent, which we cut in two with our axes. We now drew Preston out of the drift, which had like to have proved his grave. His bed-fellow, who had been much weakened by sickness, was already dead; he was the man whom we had dragged from Jackson's grove to "Pawnee fork;" where he had been picked up by Mr. Brown; since which time he had been recovering fast. Poor fellow! it was his destiny to leave his bones on the desert prairies, where wolves howl his requiem. I caused the men to dig him also out of the drift, and to put his body into a wagon, in order that we might bury him at the Cotton Wood fork.

Preston complained bitterly of the cold; the sudden chill which he experienced when we dragged him forth (for he seemed at first to be in a perspiration) instantly stiffened his limbs. He begged, he prayed, that we would bring him near the fire; but we put him into a wagon, and, wrapping him in buffalo robes, we started on our march.

Several mules had already been frozen to death. As we proceeded, mules, that had started off in apparently good condition, would drop down in the harness, and their limbs would become perfectly rigid. Even one of the oxen fell down benumbed with cold. In a few hours we lost six mules and one ox, so that our road was marked out with dying animals. As we approached our destined camp ground, we saw a wolf that was so badly frozen as to be unable to move. One of the men put an end to its sufferings by a bullet from his rifle.

The snow on the general surface of the prairie was not more than three or four inches in depth, so that I accomplished the march without any great difficulty by twilight; but none of the teams arrived until 11 o'clock that night.

February 22.—I now made all my arrangements for going on with Mr. Smith, leaving my men to await the movements of Mr. Brown, who had agreed to transport their provision and bedding as far as Independence, Missouri.

During the day, we dug a grave for the unfortunate man who was suffocated beneath the snow. On a high bluff point, that overhangs a deep pool of quiet water, close to the spot where the road crosses Cotton Wood fork, is the last resting place of poor Pilcher.

Mr. Brown was in great embarrassment all day about the safety of his teams. Several of them had not yet arrived; the poor animals had been out another night upon the prairie, where they could not get a morsel to eat.

In the evening, Preston came into camp; he had been put into a wagon that remained last night upon the prairie, about 8 miles distant. This morning he started and walked to camp. He looked as if he had been sick for a long time, so great was the shock his constitution had sustained. He told us that when he first awoke, he felt very comfortable, and had no difficulty in breathing. At length he perceived his companion was dying. He now made efforts to escape from his perilous situation, and found

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he was hemmed in on all sides by the snow. He redoubled his exertions, but his struggles served only to exhaust his strength, and he found great difficulty in breathing. The full conception of his awful situation now burst upon him; he struggled violently, but not a limb could he move, and he had sunk into the depth of despair, when we fortunately rescued him from his icy tomb.

Once more an air of happiness seemed to diffuse itself over the faces of the men. Preston's story awakened us to a lively perception of the fearful vicissitudes through which we had passed. Our hearts acknowledged how futile would have been all our efforts, unless assisted by the Great Being who rules the winter storm. The men seemed to vie with each other in reciprocating acts of attention and kindness, and it seemed as if there were no bounds to the generous impulses which actuated their conduct towards myself.

February 23.—My pedestrian exercises were now terminated, after having accomplished 179 miles of the 352 miles which lie between Jackson's grove and Fort Leavenworth. Although I was perfectly willing to walk, and had now become so accustomed to do so, that I felt no inconvenience from the exercise, still I was not permitted to choose; Mr. Smith made me mount his *horse*, while he journeyed on foot. We found Mr. Hoffman and Mr. Miller, who had started yesterday morning at the same camp with ourselves. They had been obliged to leave their wagon, and pack all their camp furniture on their mules. We halted within three miles of the Diamond spring, where we found plenty of green elm, for fuel for our fires.

February 24.—The day was stormy and cold, but we heeded not the weather, and pressed on until we reached "Council grove." Here we found grateful shelter in that noble grove whose huge walnut trees raise their limbs aloft, as if to battle with the clouds in our defence, while their lower boughs were stretched over us to shield us from the pitiless pelting of the storm. Paroquettes were sweeping rapidly in large circuits among the topmost branches of the ancient denizens of the forest, and their screams shrill and grating echoed through the lofty arches of boughs, now shorn of their summer glory. During our day's march, flocks of the pretty snow lark were continually taking wing as we advanced, and warbled forth their sweet notes as they flew. As soon as darkness shrouded us, some large screech owls commenced a serenade, and the forest rang with a concert of their doleful music.

Here, as well as at "Cootton Wood fork," we saw a great many prairie hens, but the snow on the ground caused us to be instantly perceived by these watchful birds, which take flight the moment we endeavor to approach them.

February 25.—It is again cloudy and very cold; a high wind is blowing from the northeast, and now and then a fog of snow arises and the small icy particles, driven by the fierce winds, make one's face feel as if raked with briar brushes. We encamped at one of the Beaver creeks. Here one of Mr. Hoffman's men killed a racoon, which was divided among his party, being the only meat they had

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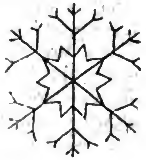
to eat. While sitting by camp fire, I noticed some beautiful forms which were assumed by the particles of snow which fell on my blanket. They resemble stars with six radii; each of these radii was ornamented with beautiful aborescent shapes resembling the cross of "Santo Domingo."

I noticed that all the icy fibres of these flakes made angles of 60° with each other; this was invariably the case with all those that I saw. The annexed sketch is an exact figure of these curious crystals.



The storm which produced these flakes bore a greater resemblance to the "snow fogs" than to a regular storm; only a few flakes were falling, so that they did not inconvenience us in the least, and we paid no attention to them except to examine their beauty.

February 26.—When we awoke, the ground was covered with snow, and it was stormy all day; the wind of the north blew hard, the snow fell fast, the ground became soft and slippery, and the ravines were filled with water. It was bad travelling for the wagon, and much worse for the men who were plodding along on foot. We, notwithstanding, made a long march, encamping in the evening at "110 creek," which is 26 miles from the preceding camp. We built huge fires, and soon made ourselves quite comfortable, although the fine particles of hail which had pelted us all day still continued to fall. The woods had been full of prairie chickens; in all directions we noticed their foot prints in the snow.

February 27.—We determined to make a long march, and in spite of the continuance of the storm we started at a very early hour. The mist of mixed snow and hail fell almost uninterruptedly throughout the day. Clouds after clouds were chasing each other across the gray sky. Once the sun shone forth with sufficient brightness to cast a shadow, but its brightness was in the next moment obscured. Under foot it was wet and slippery; the road was full of pools of snow and mud. We marched twenty-five miles to "Willow spring," where the road to Fort Leavenworth turns off towards the north; continuing our journey two miles further, we encamped on a stream which adds its tribute to the waters of the river Wakaroosa. Here we found a plenty of hickory wood, a fine spring, and as good grass as the season affords; during the day we saw flocks of snow larks and several prairie chickens. The ravens have given place to the crows; the latter birds seem to confine their wandering to the precincts of American corn fields.

February 28.—We had now but thirteen miles to march before reaching the Kansas river. I rode on rapidly, and soon overtook

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Mr. Hoffman's party; they had been almost starving for the last two days, and were travelling rapidly, in hopes of soon reaching some Indian hamlets where they might procure food; they soon reached a house, the first they had seen for a long while, and they then asked for food for themselves, and fodder for their animals. The Indians who lived here told them that it would be wrong to sell anything, as it was Sunday. But they soon found other Indians who were not so scrupulous.

When we reached the Kansas river, we found it full of ice, which was so packed together that it stood up edgewise, and seemed to offer an impenetrable barrier to our progress. We halloed to the Indian ferrymen who were on the opposite side of the river; they jumped into a flat boat and started to reach us; but, finding they could not get through the ice, they returned; we were, however, determined to cross if it were possible; and, getting into a flat boat which happened to be on this side of the river, we pushed off from the shore; soon our boat became wedged in the ice; we then pushed it back far enough to acquire impetus to rush forward; by innumerable repetitions of this manœuvre, we forced our way clear into the rapid current of the stream; the long poles that we were using could not touch the river bottom. But we fortunately had "sweeps" on board; with them we rowed our boat, and managed to land on the opposite side. Our men now jumped ashore and "cordelled" our craft up the stream to the proper landing place. Our successful passage over was entirely due to the perseverance and good management of the wagonmaster, Mr. Smith.

We encamped on the river bank, where there is no scarcity of all the varieties of timber that the heart of man can desire.

March 1.—At the dawn of day we prepared our frugal repast. We now felt at home, and as the sun rose there seemed to be a cheering brightness in his rays which is not to be seen in "New Mexico," nor on the prairies.

There was a majesty in the lofty groves which now surrounded us, and a music in the plash of the wild duck as it lit upon the bosom of the river; there was music even in the scream of the parroquette that swept over our heads; there was a charm in everything, for we now really felt that our trials were at an end.

At a rapid pace I started off for the fort. As I passed through the bottom lands of the Kansas, the prairie chickens were constantly flying up with a loud whirring sound.

At an early hour in the afternoon I reached fort Leavenworth, where I was most kindly received by Colonel Wharton, the commander of this post.

Very respectfully, your obedient servant,

J. W. ABERT,

Lieut. Corps Topographical Engineers.

To Colonel J. J. Abert,

Chief Corps Top. Engineers.

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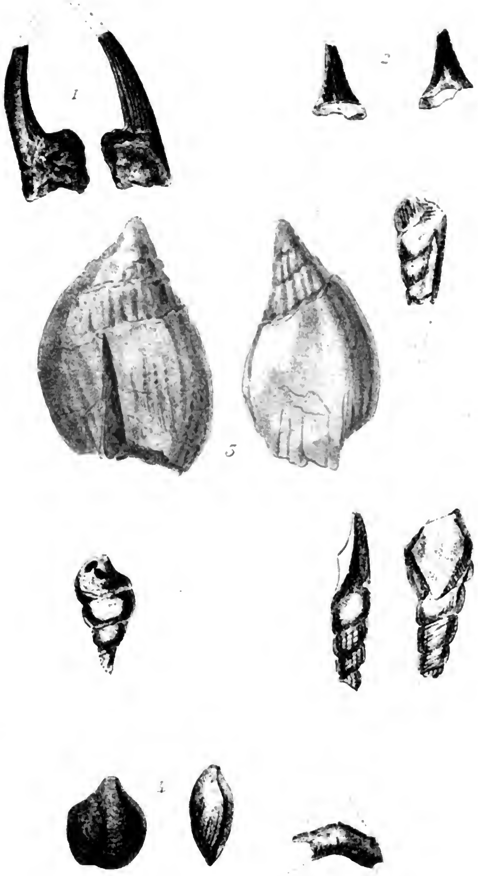

1 & 2 Shark's Teeth Poblazon.
3. Fossils from Poblazon.
4 Fossils from Lead mine Tuerto

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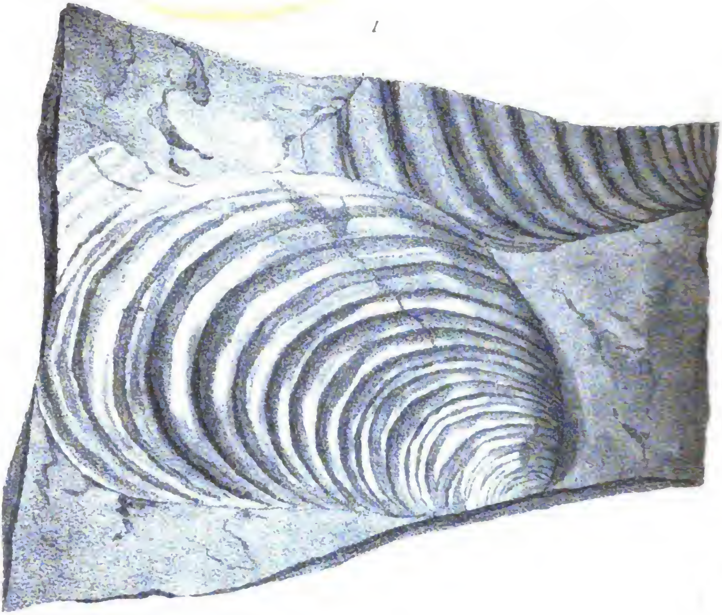
1



2

1 Inoceramus Rio Timpa Lat. 37° 41' Long 104° 07'
2 Fossil from Coal bed Raton

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Notes concerning the minerals and fossils, collected by Lieutenant J. W. Abert, while engaged in the geographical examination of New Mexico, by J. W. Bailey, professor of chemistry, mineralogy, and geology, at the United States Military Academy.

Cretaceous fossils from Poblazon, west of the Rocky mountains, latitude 35° 13', longitude 107° 02', strata dipping west.

The fossils from Poblazon consist of gigantic hippurites,* casts from the cells of several species of ammonites, valves of inocerimus, identical with a species figured in Frémont's report, plate IV., fig. 2,† casts of small univalves and bivalves too imperfect for determination; and teeth of sharks.

These fossils prove that the strata from which they were taken, belong to the cretacious formation. The existence of vast beds of this formation on the *east* side of the Rocky mountains, and extending from the Upper Missouri to Texas, is well known. The occurrence of the same formation on the western side of the primary axis of the Rocky mountains is quite interesting.

The dip of the rocks at Poblazon is to the west, or from the Rocky mountains; and this proves that these mountains have been elevated since the deposit of the cretaceous beds. It is, therefore, probable that the cretaceous beds on both sides of the Rocky mountains were made by the same ocean.

Bituminous coal, and coal fossils.

From the Raton, east of the Rocky mountains, latitude 37° 15', longitude 104° 35', from the strata dipping east.

The fossils accompanying the well characterized bituminous coal from the Raton, consists chiefly of large ovoid leaves, with very distinct branching veins, which consequently must have belonged to decotylédonous plants of comparatively modern origin. It is an interesting fact that no ferns, or other of the common coal fossils were found. It is thus established beyond a doubt, that the deposit of coal at the Raton is not the equivalent of the great coal formation of the United States, but is of a much more recent date, perhaps corresponding to the "Brora" coal.

The existence of coal on the eastern flank of the Rocky mountains has been noticed before, and some have supposed that it indicated the western outcrop of the great carboniferous formations of of the western States; this view, however, is not confirmed by the deposit at the Raton, which is decidedly a far more recent formation.

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* These are the remarkable specimens composed of parallel plates covered with hexagonal reticulations.

† Frémont's specimens were found on the east side of the Rocky mountains, latitude 39°, longitude 105°.

Fossil Woods.

There are two specimens of these; one a semi-opalised fragment from Wett mountain, near the Spanish peaks, the other a silicious pebble from St. Ana. Neither of them retain the original structure in sufficient perfection for determination of its character by the microscope.

Non-fossiliferous rocks.

The most interesting specimens of rocks were the following:

1st. From the cañon of Vegas: A fragment of well characterized granite, and another of mica slate.

2d. San Miguel: A reddish decomposing granite.

3d. Purgatory valley: A black slate.

4th. Cañon Infierno: A compact hornblendic mass, with red specks, probably a trap rock.

5th. West of the Rio Puerco: "A white clay, used for white-washing."

This is a calcareous, rather coarse grained mass, with occasional grains of silicious sand and pebbles; it effervesces briskly with acids, and tastes strongly of lime after being heated by the blow-pipe. It contains no polythalamia.

6th. Top of little knools near "Rio Vermejo:" In a state of decomposition, but resembles an indurated sand stone.

Minerals.

The minerals are mostly of little interest. The ores are not rich in themselves, nor can they be relied upon to determine the value of the mines. The gold ores from "Viejo Real," "Tuerto," &c., consist chiefly of cellular quartz, discolored by oxide of iron, and rarely showing any particles of gold. The copper ores are chiefly chrysalla and green carbonate of copper. Below are given the true names of some specimens, to which were attached the labels copied in the first column.

1st. Smoky quartz from Padillas: A nodule of obeidian; fuses easily by the blow-pipe.

2d. Salt from the Laguna near Chilile: Two layers, one of chloride of sodium, the other of sulphate of magnesia.

3d. Blossom of the gold, Tuerto: Quartz in small elongated prisms.

4th. From between Rito and Rio Puerco: A nodule of white compact gypsum.

5th. From between Poblazon and Ciboletta: Small plates of selenite.

6th. Belen abundant in all the sierras: Handsome plates of silinite.

7th. Fossil moss from the gold mine at "Viejo Real:" Dendric infiltrations of oxide of iron.

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REPORT OF LIEUT. COL. P. ST. GEORGE COOKE

OF

HIS MARCH FROM

SANTA FÉ, NEW MEXICO,

TO

SAN DIEGO, UPPER CALIFORNIA.

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REPORT.

San Louis Rey,
California, February 5, 1847.

Sir: In obedience to army of the west order, No. 33, of October 2d, I returned from La Joya, New Mexico, to Santa Fé, to take command of the Mormon battalion. I arrived there on the 7th October.

I found that the paymasters, from whose arrival you anticipated a plentiful resource of money for the quartermaster department, had brought so little specie that no payment of troops could be made. The consequence was, that Captain Hudson's company of volunteers for California, which you had assigned to my command, could not mount themselves; and the quartermaster's department, which scarcely commanded a dollar, could hardly have furnished the transportation. Owing to these difficulties, the captain's new company was broken up by Colonel Doniphan, commanding.

A portion of the battalion of Mormons arrived the evening of the 9th October, under First Lieutenant A. J. Smith, 1st dragoons, who had, in the capacity of acting lieutenant colonel, directed its march from Council Grove. The rear of the battalion arrived the evening of the 12th. On the 13th, I assumed command, with the rank of lieutenant colonel, by virtue of your appointment. Its aggregate present was 448. I found that their mules were entirely broken down, and that as many as sixty men had, from sickness and other causes, been transported in wagons much of the march; and that there were twenty-five women, besides many children. The assistant surgeon of the battalion, Dr. Sanderson, and the senior officer of the department, Dr. De Camp, reported on the cases of a very large number, as subjects for discharge for disability. But the colonel commanding determined, under all the circumstances, to retain them in service, and ordered them to be sent to winter at "Pueblo," on the Arkansas river, above Bent's fort. There the Mormons have a temporary settlement, and there Mr. Smith had sent, from the crossing of the Arkansas, a party of ten, commanded by Captain Higgins, in charge of a large number of families, which had theretofore been attached to the Mormon battalion. This detachment had orders to join the battalion at Santa Fé. (They arrived after its march, and, I learned, obtained permission to return to the Pueblo.) About this time, I learned that you had left your wagons, in consequence of difficulties of the country; and was anxious, for the benefit of all, to disen-

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cumber the expedition of the twenty laundresses. Learning that the most of them wished to go with the detachment to the Arkansas, I ordered them all to be sent there. With a sufficient number of able-bodied men (husbands of the women) to take care of it, the detachment amounted to eighty-six, and was placed under the command of Captain Brown.

I urged every preparation for the march, but it was impossible to complete them before the 19th of October; the battalion was paid, with treasury drafts, on the 16th and 17th. There was no salt pork in Santa Fé, and a sufficiency did not arrive until the evening of the 16th. Beef cattle, furnished under a previous contract for the battalion, were received the night of the 17th; and a quantity of pack saddles the same evening. On the 19th of October, I marched out of Santa Fé, and encamped at Agua Frio. At the earnest request of two captains and three sergeants, their wives were permitted to accompany the expedition; having their own wagons and mules, and provisions.

The rations had been issued to the companies, and each had three mule wagons, and one drawn by oxen; (these last were to be sent back on leaving the river.) The rations were sixty days of flour and salt, sugar and coffee; thirty days of pickled pork, and twenty of soap.

The mules furnished me were mostly poor and worked down; the half of them were utterly unfit to commence an ordinary march. A number, as well as of oxen, were left behind, unable to walk, in the first forty miles. Thus, I was obliged to exchange them two for one, and to purchase many others. For the first 150 miles, on the Rio Grande, there was, at that season, no grass deserving the name. I purchased, when I could, corn and fodder, but in very small quantities. I had 380 sheep purchased, near Socorro, and beeves, to make up the sixty days' rations.

About 75 miles below that point, I became convinced that the march must fail, unless some improvement was made. I was marching about eight miles a day, in as many hours, through the deep sand; the mules overworked, growing poorer, giving out, dying and left behind each day.

From the opinions of the guides, there was also reason to apprehend that the supply of provisions was inadequate; and the ox wagons were then to go back. There were twenty-two men on the sick report, who, with the arms and knapsacks of others, encumbered the wagons. I called on the assistant surgeon and company commanders for lists of those they believed worthless for the march; fifty-eight names were soon given to me. Captain Burgwin's camp was 58 miles above. I resolved, then, to send back these fifty-eight men, with twenty-six days rations, with one ox wagon, and to leave the other two there, to be sent for, retaining the teams; and to make another reduction of baggage. Many tents and camp kettles were left in the wagons, and all the upright poles, for which muskets were used as substitutes. (The backs of the tents were opened, and a piece inserted, so as thus to become very large and nearly circular, in which ten men were ac-

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commodated.) The oxen I used in mule wagons; packed those unfit for draught, and also, though very lightly, the poor extra mules. The detachment went in command of a lieutenant, who received orders to report, for ultimate instructions, to the officer commanding in the territory. A calculation showed that by these measures, with increased means of transportation, the loads were reduced 20 per cent.; and also that the rations (or half rations) of the battalion were increased by eight days. Then, and only then, could I begin to see my way to the end, with confidence.

After these two weedings of the old, the feeble and sickly, from the battalion, lads and old grey-headed men still remained.

The numerous guides and hirelings you sent to me, I found at the lowest village; they had been idle for weeks; and I found I was to venture, with my wagons, into a wide region, unknown to any of them.

The river route improved greatly, and, opposite, was apparently a practicable gap in the mountain barrier, between mine and the Chihuahua road, (the fine but badly watered stretch known as the Jornada del Muerto.) About thirty miles lower, and in the vicinity of a point called San Diego, the mountains, which so far had confined the road to the river, break off, and then I turned short to the right, on the arid table land of Mexico, which I found studded with a profusion of isolated mountains, of volcanic origin. My method, now, was this: Leroux, with five, six or seven others, would get a day in advance, exploring for water, in the best practicable direction; finding a spring or a puddle, (sometimes a hole in nearly inaccessible rocks,) he would send a man back, who would meet me, and be the guide. This operation would be repeated until his number was unsafely reduced, when he would await me, or return to take a fresh departure. This was the plan, but, ever varying and uncertain, attended, of course, with much anxiety; and, sometimes, the inconvenience of neglect or tardiness on the part of the guides, making the road, once or twice, to vary from the better course, which a more thorough examination, in the first instance, would have discovered.

Such, with some vicissitudes of risk and suffering, and the accidental aid of a little confused information from a trading party we encountered, was the manner of my progress for about 250 miles, from the Rio Grande to the San Pedro, a tributary of the Gila; but I anticipate.

Thus I reached the Ojo de Vaca, about 26 miles south from the copper mines, on an old road to Yanos, used for transporting the ore. To the west appeared a vast prairie opening, between the mountains; it was the course; but the principal guides had each his dread of it, founded upon vague information, from Indians, of its destitution of water; and watering places might exist, and not be found by us. They had explored about 25 miles of it, finding an out of the way and insufficient hole of water, ten miles distant.

I ascended a high peak, and, there taking the bearings of distant landmarks, which they professed to know, earnestly consulted with them and the interpreter, who had lately passed through

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Sonora, as to the best course to be taken. They were deceiv
themselves, as I believe, and so deceived me, as to the di
rection of Yanos; and gave a decided opinion as to the unsafe
of venturing into the prairie; and, also, that it would be best
take the Yanos road, and thence, by an old trail, a road forme
used to connect the presidios or frontier garrisons, Yanos, Fr
teras, Fruson, &c.

The next morning, having reluctantly assented, I took the Ya
road. A mile or two convinced me (and them) that its general
rection was very different from their representations; and *eas*
south. I then took the responsibility of turning short to the rig
and ordered them to guide me to the water hole. I had se
confused information of water to be found in the directio
San Bernadino. Mr. Leroux had been very decided that it wo
be necessary to go by this southern point, even if I ventured
far on the unknown prairie. I then marched 40 miles with
water, except a drink for part of the men, where I had hoped
find enough for encamping. The battalion were not prepared
it, and suffered much. These were anxious circumstances, and
responsibility I had taken weighed heavily upon me; their safe
and my success seemed both doubtful. Fortunately a large spr
was reached the second night, after a continuous march of thirte
hours; and when men and mules were at the point of exhausti
for the weather was quite warm.

I was joined here by a party of New Mexicans, who had bee
trading with the Apaches. I purchased twenty-one mules of the
giving a check on the assistant quartermaster at Santa Fé.
also hired one of them to conduct Leroux to the mount
valley, where they had left the Apaches, and sent him to sec
an Indian guide. A day or two after, we found a trail leading
ward San Bernadino; and the fourth day, early, just after Chab
naux, the only guide then present, had very unwarrantably gone
hunting, we fell into what was believed to be the trail or road fro
Yanos to Fronteras; and it immediately led us to a precipitous
rocky descent, of perhaps a thousand feet, amongst broken, w
and confused mountain peaks, which extended as far as could b
seen from our great height. I soon found the trail could not b
made passable for the wagons; and I hunted myself for a more pr
mising descent, and, in fact, saw a part of the proper one; but ver
inaccessible from the mountain height on which I then was. My
next care was to seek the nearest ground suitable for a camp; for
tunately I found water about a mile off. All pronounced the
country before us impassable for wagons; I, nevertheless, imme
diately organized a large working party, under Lieutenant Stone
man, and sent him to make a passage. That night Leroux ar
rived, bringing an Apache chief, whom he had got hold of with
difficulty, and probably great address; so shy were they found
Next morning, it was owing to Leroux's decided assertions and
arguments that there could be and was no other known pass but
the horse trail, that I did not *insist* on his thorough examination
He even asserted, but was mistaken, that he *had* examined the

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ening I had seen and described, and believed might be a wagon ad. Meanwhile, the party continued the second day hard at work ith crowbar, pick, &c.; whilst I sent one company and about alf the baggage, packed on mules, to the first water on the trail, a deep ravine below. It was about six miles, and the mules ere brought back in the evening. Next morning they took the st of the loading, and I succeeded that day, with much labor and fficulty, breaking one, in getting the wagons to the new camp. r. Foster accidentally found the outlet of an old wagon road, nto mine,) and, following back, it led him to the verge of the ain, about a mile from our point of descent. He says this is lled the pass of Guadalupe; and that it is the only one, for many indreds of miles to the south, by which the broken descent from e great table land of Mexico can be made by wagons, and rarely pack mules. I hold it to be a question whether the same diffi-ılt formation does not extend north, at least to the Gila. If it is , my road is probably the nearest and best route. But if the airie, to the north, is open to the San Pedro, and water can be und, that improvement will make my road not only a good but a rect one from the Rio Grande to the Pacific.

San Bernadino is a ruined ranche, with buildings enclosed by a all, with regular bastions. It overlooks a wide, flat and rich val-y, watered by a noble spring, which runs into one of the upper anches of the Huaqui river, which is but a few miles distant. ere I succeeded in meeting a few of the Apaches, and obtained a iide, who went about 20 miles, and described the rest of the route the San Pedro. He was afraid to venture further, and return alone ver the plain; the point where he turned back was within four-en miles of the presidio of Fronteras. It was in the mountain ass that we first saw the wild bulls, from which the command ob-ained their exclusive supply of meat for about two weeks. They re the increase from those abandoned, when the two ranches of an Bernadino and San Pedro (on the river of the same name) were roken up, in consequence of incessant Indian attacks. They ave spread and increased, so as to cover the country; they were as ild and more dangerous than buffalo.

I made the next 62 miles, to the San Pedro river, with little more ifficulty than cutting my way through dense thickets of mezquite nd many other varieties of bushes, all excessively thorny. It was ut 27 miles without water over the last divide; there was snow ne day, and for about two weeks, at that time, we suffered with old. I descended the San Pedro 55 miles, to a point whence a rail goes to Tueson. The guides represented that it was 85 miles f very difficult, if practicable, ground to the mouth of the San Pedro, and one hundred from there to the Pimos; also, very bad, nd little or no grass; and, on the other hand, that it was only bout 90 miles of a good road, with grass, by Tueson to the same oint. I reflected that I was in no condition to go an unnecessary undred miles, good or bad; and that, if their statements were rue, the future road must go by the town. I had previously sent Leroux, Foster and others to examine if there was water on the 30

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miles, which was the estimated distance to Tueson. Lerou just returned; he had found water at a "still-house," 20 miles the river; and had encountered there a sergeant's party of dra He had made up a story to get off; but, to give it color, Dr. F fancied it necessary to go on to the town. Leroux was tol Indians, that 200 soldiers, with artillery, had been there co trated. I reached the water next day, and probably surprised the geant's party. I found them cutting grass; but the sergeant, the bearer of a flag, delivered me a singular message from the mander, which amounted to a *request* that I should not pa post. Next morning, I made prisoners of four others, wh come, probably, with provisions; and as Dr. Foster's long st made me uneasy for him, I dismissed one of them with a not ting that I should hold the others as hostages for his safety promised to release the prisoners if he was sent to me that eve Deceived as to the distance, but expecting to encamp without I marched late; and, having made twelve miles on a road very cult in places, I encamped at sundown, on the high prairie midnight, Foster reached me; with him came two officers; one "commissioner," with written instructions to offer a kind of by the terms of which I was to pass the town by a certain and to hold no communication with the people. I rejected and demanded a capitulation; which the commissioner, with form, wrote, after his own fashion, in Spanish, and I signed it. terms bound the garrison not to serve against the United State ring the present war; and, as the only further tokens of surre to deliver to me two carbines and three lances; my men to freely and trade with the inhabitants of the town. After a te conference of two hours, in which we had been very friendly very cold, the officers departed, assuring me my terms could accepted. Believing I was eight or nine miles from town, I measures to march at daylight; but unfortunately the mules herded in mezquite bushes, and without water, the half of the the darkness of night, escaped the guard; and I could not pr march, with any prudence, before 8 o'clock.

The distance proved to be sixteen miles. About five miles town I was met by a dragoon, or lancer, who delivered me a le simply refusing my terms. I told him there was no answer, a rode off. I then ordered the arms to be loaded. Immediately a ward, two citizens rode up, and reported that the place had evacuated. I arrived at 1 o'clock, and, having passed through fort, encamped in the edge of the town. Two small field pieces been taken off, and all public property of value, except a large of wheat.

The garrisons of Tubac, Santa Cruz and Fronteras had been co centrated, and, I understood Dr. Foster, there were altogether ab 230 men; but I have lately learned that he only estimated them 130. I remained in camp the next day, December 16. There very little grass, and I fed my mules, cattle and sheep, on the whe (and brought off enough for two more days, in the adjoining deser That day, to cover some small parties of mule hunters, I made

noissance, with about sixty men, marching half way to an In- village, ten miles off, where the enemy were stationed. (I in- ed attacking him under favorable circumstances, but the path ne through a dense mezquite forest, very favorable to an am- . I learned, however, that this demonstration caused him to inue his retreat.)

ie garrison attempted to force all the inhabitants to leave the with them. Some of them returned whilst I lay there, and I pains that all should be treated with kindness. The day I ar- d there, a detachment of twenty-five men, who had been posted ie Pimos, to observe or harrass my march, having been sent for xpress, passed unobserved round a mountain, near town, and ed the main body. (I afterward learned that they had made a atening demand for the mules and goods left for me with the ian chief. He refused, and expressed his determination to re- , by force, any attempt to take them.) On leaving T., I to its late commander, Captain Commaduran, by a citizen mes- ger, a letter for the governor of Sonora, (and I afterward re- ed an answer that it would be transmitted.) It is appended. All igs considered, I thought it a proper course to take toward a uted popular governor of a State, believed to be disgusted and ffected to the imbecile central government. It was intimated me, whilst in Tueson, that if I would march toward the capi- of the department, I would be joined by sufficient numbers to ct a revolution.

On the 17th, I marched late, as I did not expect to find water. 8 o'clock, p. m., I encamped 24 miles from Tueson, with no ter or grass. Ten or fifteen miles further there is a little water, a mountain, close to the road, but it could not be found; and I rched, the second day, *thirty miles*, and, at 9, p. m., again en- mped, without water; but the men, about sundown, had a ink from a small puddle, too shallow for the water to be dipped th a cup. On the *third* day, I marched, early, eight or nine miles, d encamped at rain water pools. The next day, I found it ten les to the Gila, at a small grass bottom, above the Pimo villages. ne mules were forty-eight hours without water; the men marched enty six of thirty-six consecutive hours, and sixty-two miles in ther more than two days, (in one of which no meat ration was sued.)

Thus the 90 miles of the guides turned out to be 128 *to the vil- ge*; 57 miles nearer than the reputed distance by the San Pedro. xcepting four or five miles, the road was excellent; but over a ue desert. There is, however, a better watered road from Tueson, hich strikes the Gila higher up. I believe this route can e well taken for six months in the year; and, that like much of he road on this side, it is impassable in summer, unless for tra- ellers. It is a great gold district; rich mines have been discovered n many of the mountains in view; but it is so barren and destitute of water that even a mining population can scarcely occupy it.

I halted one day near the villages of this friendly, guileless and ingularly innocent and cheerful people, the Pimos. There Fran-

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cisco met me with your letter from Warner's ranche; he brought with him seven mules found on the Gila; and, altogether, I obtained, at the villages, twenty, which had belonged to the dragoons. They were not sufficiently recruited to be of much service. I traded the Indian goods, and every spare article, for corn. After feeding it several days, I brought away twelve quarts for each public animal, which was fed in very small quantities.

With the aid of a compass, and closely estimating the distance, I have made a rude sketch of my route from the point on the Rio Grande, where our roads diverged, to their junction, near the villages. It is herewith submitted. I have good reason to believe that, even with pack mules, better time can be made on my route than yours; and the *mules kept in good order*, for mine improved on the greater part of it. On the 27th December, (after making the forced march, without water, across the bend of the Gila,) in consequence of the information received in your letter, I determined to send my useless guides express, to give you information of my approach, &c; hoping thus, as I said, to meet orders at Warner's ranche on the 21st of January, and to be of service in your active operations. I also sent for assistance in mules, understanding that you had placed a number of them in that vicinity.

Sixty or seventy miles above the mouth of the Gila, having more wagons than necessary, and scarcely able to get them on, I tried the experiment, with very flattering assurances of success, of boating with two ponton wagon beds, and a raft for the running gear. I embarked a portion of the rations, some road tools, and corn. The experiment signally failed, owing to the shallowness of the water on the bars; the river was very low. In consequence of the difficulty of approaching the river, orders mistaken, &c., the flour only was saved from the loading, and the pontons were floated empty to the crossing of the Rio Colorado, where they were used as a ferry boat. I passed that river on the 10th and 11th of January. On the first day and night, the loading of the wagons, and many men, were boated over. On the morning of the 11th, the mules were driven two miles, from grass; then drew the wagons through the long ford of a mile, nearly swimming. The wagons were then loaded in the willow thicket, and I marched 15 miles over the sandy road, to the first well, the same day; a great effort and labor. But as there was *no food* for the mules on this side, I deemed it so necessary that I forced it, against every obstacle; marching, in fact, when one company's wagon was in a hole in the middle of the river; the sheep and rear guard on the opposite bank. In the well I found *no water*; and, when obtained by digging deeper, it was in quicksand, and quite insufficient for the men. I had another well dug; and, against *hope* almost, when considerably below the water level of the old one, that of the river water suddenly boiled up.

I viewed this, as in other instances, a Providential *deliverance*. It was the most trying hour of my long military service. That water failing, the next well would also; and *all the circumstances well considered*, it will be found that on obtaining it not only de-

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nded my military success, but the lives of very many, who justly uld hold me responsible.

When of no real use to me, some wagons, which were broken on e march, were left, in order to save the mules. At this first well left three, because the mules were unequal to drawing them. I d then remaining one for each company, and two others. I sent rward a strong party to the next well, to prepare it and g another. I arrived there the second day, soon after noon; and, ıring my stay, until 11, a. m., the following morning, I could not ıtain enough of water. There I left two more wagons. (Arrangeents were made for sending for all these wagons, the moment I rived at the first ranche.)

I then took the direction of the "pozo hondo," the *deep well*; nding a party through the first day, and arriving, before noon, the cond. Although a second deep well had been dug, the water was sufficient even for the men to drink. I had spent the night withıt water, and thirty miles of desert were still before me; the men ay-worn and exhausted, half fed, and many shoeless. But I met ere a relief of mules and some beeves. Mr. Leroux had sent back ty-seven mules, which were chiefly young, unbroken, and as ıld as deer, and the cattle, in one body, (and by poor hands.) So day's time had been lost, and twenty of the mules.

I immediately had a beef killed, for a meal; a drink of water *sued* to the men; the wild mules caught, by their Indian drivers, ith the lasso, thrown, haltered and harnessed; the poor animals, hich *then* had not drank for thirty-six hours, struggling despetely during the whole process, which lasted above two hours, ıder a hot sun. Then I marched until an hour after dark, and ılted to rest, until two o'clock in the morning. I had chosen a ıot where there was some large bunch grass, which was cut for the ules. There was no moon, but, at two o'clock, the battalion arched again; and, at mid-day, having come 18 miles more, after ng ascending its dry bed, met the running waters of the Carizita. he most of the animals had been without water about fifty hours. ere there was but little grass; and I marched, next day, 15 iles, through the sands, to the Bajiocito; the poor men staggering, terly exhausted, into camp. At this time there should have been ılf rations of flour for nine days; but, owing probably to inevible wastage, the last of it was eaten here. I rested a day, and reıived, at evening, a letter from Commander Montgomery. It adsed me of your march to Pueblo; of the tardy arrival of y express, and of communication with you being cut off.

Next day, I encountered extraordinary obstacles to a wagon road, ıd actually hewed a passage, with axes, through a chasm of solid ıck, which lacked a foot of being as wide as the wagons. Two them were taken through in pieces, whilst the work was going ı. So much was I retarded that I encamped, at dark, on the ountain slope, making but seven miles, without water, and withıt being prepared for it. San Philippi was six miles on this side, ut there was a ridge between, so rough with rocks, that, after ıuch labor, it took extreme care to get the wagons over in day-

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light. At San Philippi I met one of my express men, who had re turned, according to instructions, to guide me. Though direct fro San Diego, he brought neither orders nor news. I encamped th night near the summit of the beautiful pass, overlooking the valle of Agua Calienta. On the 21st day of January, I arrived and e camped at Warner's ranche; the very day, as it happened, I h promised, in my letter of December 27.

This was seven miles off the road to San Diego; but I had r solved, the night before, to march for the Pueblo de los Angele where the enemy had concentrated, unless I met orders or fre information. That which I had, placed your forces approaching on the south, and Lieutenant Colonel Frémont's from the nor Thus, I should advance from the east, and from the only pass lea ing to Sonora. I halted at Warner's the 22d, to rest and refre my men, before commencing, as I hoped, active operations. T day was required, in fact, to obtain beef cattle, and to collect t new mules, many of which had escaped to their wonted pastures that vicinity.

On the 23d, I marched 18 miles, on the road to Pueblo. Th night we were exposed to a drenching rain, and a wind storm, whi prostrated every tent. The storm continued the next day; I, how ever, marched, over a very bad road, three or four miles, to mo sheltered ground, and better grass for the animals. (A mountai torrent in front would have forbidden further progress.)

On the 25th, I marched into the Temecala valley, and encampe four days' march from Pueblo. There I received a letter, writte by your orders, which had followed me by Warner's. From thi letter I could infer that hostilities were suspended, and that I wa expected at San Diego. Accordingly, next morning, I left the val ley, by a very difficult outlet, and, descending into that of the Sa Luis, fell into the road leading from Pueblo de los Angeles.

At San Luis Rey I received your instructions, by express to march to San Diego mission, and there take post. I arrive there, by a very bad cross-road, on the 29th of January, and th same evening reported to you, in person, at San Diego.

This march from Santa Fé has extended, by my daily estimate to 1,125 miles. It has been made in one hundred and two days, fourteen of which no march was made; so that the marching da average slightly less than thirteen miles. The rest days ha been very nearly one in seven. It is believed, by many who hav experience, that the weekly day of rest is advisable on a lon march, even for speed. In looking back, I find that the half o mine were unavoidable detentions. I made, also, some twelv marches of less than nine miles, in consequence of extraordinar bad road, or the delays of road making, over difficult ground; an also the necessity, at times, of accommodating the marches an camps to inconvenient watering places.

If I had continued on the most direct route to San Diego, th distance would have been rather under 1100 miles, (about 13 miles from Independence, Missouri, by Santa Fé.)

The constant tenor of your letters of instruction made it almo

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a point of honor to bring wagons through to the Pacific; and so I was retarded in making and finding a road for them. From this road, any that may follow will have various advantages. The breaking the track, often through thickets of mezquite and other thorny bushes, although worked on by pioneers, was so laborious that I habitually relieved the front wagons about every hour; but a team on a firm, open prairie, labors much less, if on a beaten track. Much of the difficult ground on the Gila, consisting of light porous clay, becomes a good beaten road. My journal and sketch indicate some points where the road may be shortened; but, between the Ojo de Vaca and the point of leaving the San Pedro river, it is probable that between 80 and 100 miles may be saved, and some bad road avoided. It is only necessary for a small experienced party, well provided with water, (with Indian guides, if practicable,) to explore the prairie, and discover the watering places. The direct distance is about 160 miles.

The worst road is on the Rio Grande, opposite the upper and middle part of the Jornada del Muerto. It may probably be avoided by coming the Jornada road half way down or more, and then crossing to the west side. I have reason to believe that there are gaps in the mountains, and opposite where my road becomes good. This assumes that the great highway will pass as far north as Santa Fé, which may not be the case.

The country from the Rio Grande to Tueson is covered with grama grass, on which animals, moderately worked, will fatten in winter.

An emigrant company may leave Independence, Missouri, from June 10, to late in August, or Van Buren, Arkansas, later. It will subsist a short time on buffaloes, and be able to lay up much of the meat, dried or salted. In New Mexico, it may rest, make repairs, and obtain supplies—particularly of mules, sheep, and cattle—which, in that grazing country, will be found cheap; it may pass through settlements for 250 miles; and they will be much extended in the rich river bottoms to the south, when the Indians shall be subdued.

I brought to California both beeves and sheep; the latter did, perhaps, the best, requiring little water; they gave no trouble; two or three men can guard and drive a thousand. At Tueson, or at the Pimo villages, fresh supplies may be obtained. The Pimos and Maracopas, 15 or 20,000 in number, wonderfully honest and friendly to strangers, raise corn and wheat, which they grind and sell cheaply for bleached domestics, summer clothing of all sorts, showy cotton handkerchiefs, and white beads. They also have a few mules and cattle. I gave them some breeding sheep. Oxen will not do *well* for draught, their feet become tender; and west of the Pimos, their food is not found sufficient or suitable; mules require no shoes; I cachéd a large quantity on the Gila, having used none.

Undoubtedly, the fine bottom land of the Colorado, if not of the Gila, will soon be settled; then all difficulty will be removed. The crossing is about 100 miles from the mouth, and about 60 above

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tide. For six months in the year, the river is said to be navigable by steamboats for 350 miles; its bottoms are wide and rich; and sugar, undoubtedly, may be grown. In winter, it is fordable at the crossing; but I think it has at least as much water as the Missouri at the same season, and *may* be navigable by steamers to the mouth of the Gila at all seasons.

In conclusion, much credit is due to the battalion for the cheerful and faithful manner in which they have accomplished the great labors of this march, and submitted to its exposures and privations. They would much have preferred to lighten and abridge them, by leaving the wagons; but, without previous discipline, all was accomplished with unity and determination of spirit. To enable the mules to endure the extraordinary labor of drawing these wagons, without a road, and often without food or water, the duties of guards were greatly increased, to herd them safely, as they did, over tracts sometimes a mile in extent, sometimes two miles from the camp, or beyond a river; and ten times did the battalion encamp without water.

I am indebted to Lieutenants Smith and Stoneman, of the first dragoons, who performed the duties of assistant commissary of subsistence and assistant quartermaster, for valuable assistance, particularly in directing the pioneers. Mr. Willard P. Hall, too, was ever ready to give me aid, particularly in the most active and venturous duties.

Thus, general, whilst fortune was conducting *you* to battles and victories, I was fated to devote my best energies to more humble labors; and all have cause to regret that the real condition of affairs in this territory was so little understood. But it is passed! and I must be content with having done my duty in the task which you assigned to me, if, as I trust, to your satisfaction.

Respectfully submitted:

P. ST. GEO. COOKE,
Lieut. Col., commanding Mormon battalion.

Brig. Gen. S. W. Kearny,
Commanding Army of the West,
San Diego, Upper California.

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APPENDIX.

Copy of a letter to the Governor of Sonora.

CAMP AT TUESON, SONORA,
December 18, 1846.

YOUR EXCELLENCY: The undersigned, marching in command of a battalion of United States infantry, from New Mexico to California, has found it convenient for the passage of his wagon train, to cross the frontier of Sonora. Having passed within fifteen miles of Fronteras, I have found it necessary to take this presidio in my route to the Gila.

Be assured that I did not come as an enemy of the *people* whom you govern; they have received only kindness at my hands.

Sonora refused to contribute to the support of the present war against my country, alleging the excellent reasons that all her resources were necessary to her defence from the incessant attacks of savages; that the central government gave her no protection, and was therefore entitled to no support. To this might have been added that *Mexico supports a war upon Sonora;* for I have seen New Mexicans within her boundary, trading for the spoil of her people, taken by murderous, cowardly Indians, who attack only to lay waste, rob, and fly to the mountains; and I have certain information that this is the practice of many years. Thus one part of Mexico allies itself against another.

The unity of Sonora with the States of the north, now her neighbors, is necessary effectually to subdue these Parthian Apaches.

Meanwhile I make a wagon road from the streams of the Atlantic to the Pacific ocean, through the valuable plains and mountains, rich with minerals, of Sonora. This, I trust, will prove useful to the citizens of either republic, who, if not more closely, may unite in the pursuits of a highly beneficial commerce.

With sentiments of esteem and respect, I am your excellency's most obedient servant,

P. ST. GEO. COOKE,
Lieut. Col., commanding U. S. forces.

To His Excellency Sr. Don MANUEL GANDARA,
Governor of Sonora, Ures. Sa.

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UNIV. OF MICH.

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JOURNAL

OF

CAPTAIN A. R. JOHNSTON,

FIRST DRAGOONS.

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JOURNAL.

September 25, 1846.—Left Santa Fé, to go 13 miles to Major Sumner's camp, preparatory to start to-morrow en route to California; camp overrun with horses to be sent to the United States—dragoons' horses; command all mounted on mules; country desolate. The creek of Santa Fé runs off in the sand a few miles below town, and cultivation ceases; no trees, cedar shrubs, dry ravines at camp, volcanic signs, and many springs, producing ten excellent springs of water, sinking almost as soon as it rises; no grass near camp fit for pasture.

September 26.—Started with dragoons at 7—the ox teams starting at daylight; the night was unpleasant, from loose animals running through camp after the corn blades purchased by the officers for their horses and mules; the grass was all eaten out before about camp and the country around Santa Fé, and to-day is thinly covered with grama grass and occasional cedar shrubs, betokening the greatest sterility; the newness of the country is apparent. Passed to-day a succession of strata dipping to the east, sandstone, blue and red marl, and white clay, intersected with basaltic dykes. South of camp a high nob is formed by an abrupt escapement of secluded shrub, dipping from the bluff to east; in several places to-day sudor volcanoes; the country is covered with basalt on the west of Del Norte, and in many places on the east plants of the artemesia sort abundant; several mules missing this morning; two wagons broke to-day—one a king bolt and one a tongue; camp in tolerable grass near San Philippe, on the Del Norte.

September 27.—Marched at 8; many of the mules which broke loose during the night gave much trouble in the morning to catch them; some complaints of their depredations on corn fields were settled, by paying damages. Passed Algodones, Bernalillo, and Sandia. In Algodones there was signs of poverty, very little being required, apparently, to feed the people upon. Fitzpatrick remarked, that he now thought more of Oregon, as he had seen many places there as good or better than the valley of the Del Norte, which he had not thought ever would support any population. At Bernalillo the wealthy cultivate the grape, and make a delicious wine. The grape grows upon small bushes on the flats, and is irrigated like the other products. We found peaches there inferor to any in the United States, as also any grape cultivated in the open air. Fences are made of clay, by putting the mould on the wall and filling it, and leaving the large brick thus formed to dry there. They appear to be rather used to keep men out than horses or animals, as in many places the top of the wall was cov-

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ered with prickly cactus. The village of Sandia is an Indian pueblo, and they appear to own large herds of cattle; but from the genuine Indian yells which proceeded from one of their dances, it is plain they have retained many of their customs since, as they have their color, in becoming Catholic in their faith. Some mules were bought at forty dollars, and some fine horses exchanged for mules at our camp, one mile below Sandia; grass good; water from Sica; a fine copper mine a few miles east of this camp in the hills; heard that the Navajoes had committed some more mischief on the frontiers; volcanic signs, dykes, strata of lava, &c.

September 28.—Remained in camp until noon, awaiting the arrival of the ox teams which had fallen behind. Many water fowl were fired at about camp, and few killed; soldiers are generally bad shots; the game was tame, and showed that the Yankees had not often been among them. Beaver slides, and their work on the cotton-wood on the banks of the Del Norte, were seen in several places; they, too, will not rejoice at the change of government. The Spanish or Indian population have never turned their furs to advantage, else they would not have lived for hundreds of years in such a close neighborhood. The volcanic appearance is less at camp; but the hill east is seamed with some igneous rock. Broke camp at three o'clock, and marched three miles to the vicinity of the ranches of Albuquerque, through the deep sand on the banks of the Del Norte; one ox team did not get up until in the night; one of them broke the hounds, and was left.

September 29.—Marched at 8; passed the ranch of Albuquerque when the people were just coming out of church; the women were carrying some saint in procession to his home; some of them held a canopy over the santa, and four carried the image; the procession moved to the sound of a drum. The general's staff partook of some refreshment at two of the houses. It was remarked how delightfully cool the houses were, after being in the hot sun. The process of building houses, make brick, dry them in the sun, build with mud mortar, lay over the roofs beams which come from the distant hills, then boards or poles, then earth and spouts, whitewash with gypsum, smear the walls outside with mud, also the floors; the houses being hung with looking-glasses and images, floors carpeted, no pain in walking about—mode of building peculiarly adapted to the country and climate. Passed Albuquerque, and the general was pressed to stop, but declined all further hospitality; crossed the Del Norte at Albuquerque, the ford being about two and a half feet deep, sandy, but not quicksand; marched eight miles below Albuquerque, and encamped on an open plain where the Navajoes crossed the Del Norte at the time of their depredations a few days since; after three companies of volunteers crossed the river to go to Cibolleta, a party of Navajoes crossed at this point and killed eight Mexicans on the east of the Del Norte. At this point there is not a tree growing within reach of us: the troops had to purchase fuel. The sand drifts in various places had accumulated in hills. Sand seems to adhere on its own kindred material instead of covering the surface of the land. It is fortunate it is so; this

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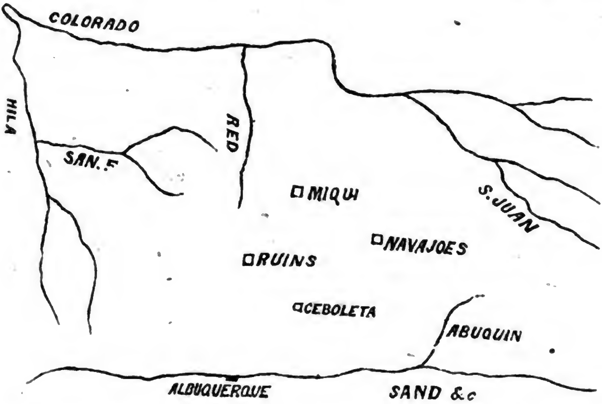
country would otherwise be impassable as well as uninhabitable. The inhabitable portion of New Mexico is confined to the immediate borders of the streams. The bottoms on the Del Norte are about one and a half miles wide on the average so far down, and are elevated but a few feet above the level of the running water.



The Del Norte is rapid and regular, and its waters can be tapped at any point without a dam, so that irrigation is carried on successfully. It remains for greater improvements, in this respect, to develope the resources of the country. A large canal along the base of the hills might carry all the water of the Del Norte, and be a means of transportation, while its surplus water could be employed in the winter for filling reservoirs, and during the summer to carry water directly upon the fields: in this way the country could be made to feed ten times the present population. The rains of this country all fall upon the mountain tops, and the valleys are thus dependent upon irrigation, as the water only reaches them in the big drains of nature. At our camp during the night we could see upon the distant hills the camp fires of the shepherds who lead their flocks afar from the habitations.

September 30.—Marched at 10; the ox teams not having overtaken us, passed Paharito, Padillo, Isleta, Los Lentes, and encamped at Los Lunas; pleasant camp in good grass, distance 14 miles; during the day had some places of deep sand through which it would be difficult to drive wagons; the road generally good; some extensive groves of cotton-wood (pecan) on the river, otherwise the country bare of trees or shrubs; volcanic rocks showed themselves on two small hills on the west of the Del Norte; the upheavement of the hill on the east of the Del Norte shows a force to the west, but at what point it has been exerted is not apparent. There is no hard wood in this country to mend wagons with—an oak bush occasionally, but generally not sound. Plantations of trees would no doubt flourish. I asked Don Jose Luna's son if he

ever went fishing in the Del Norte; he said no; he was afraid the Navajoes would catch him.

October 1.—Marched at 9; the ox teams being near camp, on their way when we started; passed a succession of valleys, and encamped below Puebletors, (distance 16 miles,) opposite the upper end of an extensive Bosque, on the banks of the Del Norte, which runs one and a half miles to the east of us. The quantity of ground under cultivation was greater, and the quantity of stock on the increase; the plain or bottom of the Del Norte gets wider.

October 2.—Marched at 8. Marched through a country mostly uninhabited; in some places the ground was crusted with efflorescent soda, and in other places it was for hundreds of yards destitute of all vegetation. The heat was excessive; the roads were good, but doubtless, from their appearance, very bad after much rain. The American troops had not yet made their appearance in this quarter, and the inhabitants looked as if they did not know what to make of our thus silently marching through their country on our distant pilgrimage to California. We have had a good deal to do with them in the way of trading mules; and they show that the tricks of horse jockeys are not confined to the Anglo Saxon race: their people have so seldom been dealt with honorably that they cannot believe any one is dealing fairly with them.

The mountains below Socora, through which we are to approach the Gila, appear in front of us; from their appearance, one would naturally look for a pass to the Gila in the gap above, instead of going around the one on the left. The apparent distance of mountains is very deceptive; the guesses vary to-day from fifteen to sixty miles about the same mountains. The knobs do not present themselves in ranges yet, nor do they appear much above the general level. The river hills passed to-day are composed of coarse conglomerate, running in seams with sand, all scarcely of the consistence of stone: pebbles of all the productive minerals mixed with pebbles of lava. The knobs on the right of the Del Norte appear to be composed of peaks of granite. The heat to-day excessive. Encamped opposite La Jozin, in a pleasant grove of cotton-woods.

October 3.—Laid in camp, awaiting the ox teams and some Mexican teams, which had fallen one day to our rear; caught some fine cat fish and soft-shell turtle in the Del Norte. During the day, an express came in from Pulvidera, 12 miles down the river, informing the general that the Navajoes had attacked the village; and he had been sent by the alcalde to bring the artillery where they were still fighting when he left; Captain Moore was sent with company "C," in defence of the Mexicans, and orders were sent to-day to Colonel Doniphan to make a campaign in the Navajo country; examined minutely the diluvial deposite which fills the valley of the

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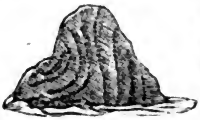
Del Norte as far as Taos; it is alternate seams of gravel and sand, apparently deposited on a shore composed of pebbles of limestone; all the primitive rock scarce; of granite in places; of lava basalt in particular localities, more or less.

October 4.—Marched at 8, taking the river road, and spending two hours at a sandy hill, where the confusion with the unbroken Mexican oxen was very great; some half a dozen men at each team, and then they went every way but the right one; came to Pulvidera, where Captain Moore reported that the Navajoes had been there—over one hundred—and had driven off quite a quantity of stock; but, as both parties appeared to be afraid, there were no wounds received; the boldness of the Navajoes proceeds from their confidence in the cowardice of the Mexicans. The alcalde rode with us to camp, five miles on, and sent one of his people to Socora for some Apaches; two came in, (one drunk;) they may be highly useful to us in getting guides through their country; the general despatched them to their chief, to meet him to-morrow night. The general here gave permission to the people of New Mexico, living on the Rio Abajo, to march against the Navajoes, in retaliation for the many outrages received at their hands. Saw a fine flock of American partridges to-day; they have no doubt just invaded the country, as I cannot hear of their having been seen before.

October 5.—Took from the alcalde certain mules which he had taken from the citizens as fines for their trading with the Apaches; these mules the alcalde had taken as his own property, and seemed to think it a hard case to think that the general should take them as public property; we marched at half past 8, and came to Socoro, having heard, just as we were about to leave camp, that the best road to the Gila was directly out from the Del Norte at this place; all the command express satisfaction at the prospect of so soon getting out of the settlements, as the Mexicans, by the want of fairness in dealing, have made every one anxious to leave them behind. It will never do to make an offer to a Mexican anything near the price, as he is sure to insist upon more, and thinks you are not in earnest, even if you send him off. We hear, at Socora, that six deserters from Major Sumner's command at Santa Fé have been taken up at El Paso by the Mexicans. The hills opposite to Secora are composed of diluvial drift rocks; back of Socora, west of the Del Norte, the mountains are composed of volcanic rocks of all colors, and various character; a white seam of a substance like magnesia; in one place, the rocks exhibited the appearance of falling into a semi-molten state; the hills at the base of the mountains are composed of fragments of the igneous rocks in an undisturbed state, with no appearance of being rounded by attrition. We had considerable discussion again this evening about the route to the Gila; the guide we engaged had not contemplated the difficulties beyond the point where he struck the Gila, and he inclines to go 18 miles south of the copper mines; we will now probably go down the Del Norte still further.



October 6.—Marched at 9, after having great trouble in getting some ox carts from the Mexicans; after marching about three miles, we met Kit Carson, direct on express from California, with a mail of public letters for Washington; he informs us that Colonel Frémont is probably civil and military governor of California, and that about forty days since, Commodore Stockton, with the naval force, and Colonel Frémont, acting in concert, commenced to revolutionize that country, and place it under the American flag; that, in about ten days, their work was done, and Carson, having received the rank of lieutenant, was despatched across the country by the Gila, with a party to carry the mail; the general told him that he had just passed over the country which we were to traverse, and he wanted him to go back with him as a guide; he replied that he had pledged himself to go to Washington, and he could not think of not fulfilling his promise. The general told him he would relieve him of all responsibility, and place the mail in the hands of a safe person, to carry it on; he finally consented, and turned his face to the west again, just as he was on the eve of entering the settlements, after his arduous trip, and when he had set his hopes on seeing his family. It requires a brave man to give up his private feelings thus for the public good; but Carson is one such! honor to him for it! Carson left California with 15 men; among them, six Delaware Indians—faithful fellows. They had fifty animals, most of which they left on the road, or traded with the Apaches, giving two for one; they were not aware of the presence of the American troops in New Mexico; they counted upon feeling their way along, and in case the Mexicans were hostile, they meant to start a new outfit, and run across their country. When they came to the Copper-mine Apaches, they first learned that an American general had possession of the territory of New Mexico. The Apaches were very anxious to be friendly with the Americans, and received them very cordially, much to their surprise. The column moved on *ten miles*, and encamped under a beautiful grove of cotton-woods, and the general issued an order reducing the command to 100 men, taking C and K companies with him, and leaving B, G, and I companies under Major Sumner's command, in the New Mexican territory. The officers to march with the expedition are General Kearny, Captains Turner and Johnston, Major Swords, quartermaster, Assistant Surgeon Griffin, Lieutenants Warner and Emory, topographical engineers, Captain Moore, Lieutenants Hammond and Davidson, 1st dragoons. Each company has three wagons, with eight mules in each, and the whole of the other companies put under requisition to supply C and K companies with the best outfits. It went hard with some of the company commanders to part with their fine teams, the accumulation of many years, in their companies; but the public service being paramount, they submitted cheerfully. The Apaches came to us to-day, and gave us four young men as guides.

October 7.—Took leave, and marched at 9; and passed an uninhabited country with fine bottoms of grass and groves of cotton-

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wood; the hills and out-country as desolate-looking as before; the most of the grass in the bottoms is of a harsh character; but the grama abounds on the hills. We passed several places where the volcanic action was perceptible; near camp, the hills are capped with a rim of black basaltic rock, some of five feet thick; about two miles from this evening's camp, passed the ruins of an old village, probably Valverde; there were no signs of houses, except the piles of dirt and pieces of pottery scattered about.

October 8.—Marched at 8; distance, 18½ miles; the bottom of the Del Norte grows narrower, and we had much rough road and sand; the thorny mezquite and other bushes making it necessary to have a pioneer party with axes to clear the road; we halted at a dense thicket of willows, in which we saw a flock of wild turkeys; passed the commencement of the jornada of 100 miles without water on the Chihuahua road; on the other side of the Del Norte, it is separated from us by a high volcanic mountain. The mountains along here seem to get more lofty; occasional seams of dark basalt or trap are seen, but most of the peaks are composed of lighter colored lava or trap, thrust up as granite usually is, and changed to a reddish color by exposure of its surface. The back-bone of North America appears to have split open along here, and all the igneous rocks have been thrust up with a general parallelism, without making a continuous range along this seam. The waters of the Del Norte run (while the waters of the Arkansas, the Gila, and other streams flow east and west) directly from it. An experienced traveller in these regions tells me that a fine road could be gotten from some place about here to the frontier settlements of Texas, on its Red river. If so, the future city of New Mexico must be about the south end of the Jornada mountain. We are now near 200 miles down the Del Norte from Santa Fé, but the stream is still unfit for any purposes of navigation. Carson tells us that, at the rate we are travelling, we will not get to Angelos in four months.

October 9.—Marched at 8, after repairing the hound of one of C company's wagons, which broke at dark last night; our road all day was very rough, and we made but little progress with the wagons; in one place, the guides were two hours hunting a route around a hill which lay in our way, capped with basalt; the basalt is of a dark color, containing, probably, a large portion of iron. It was seamed in various ways

with a light colored substance, which divided the mass into irregular spheroids. Some of the basalt was cellular, some solid; in all, about eight feet thick. In another place, the same seam fell into a hollow, and was about fifteen feet thick, with an irregular columnal structure; near this was a mass of volcanic cinder. This basalt, or trap, capping the hills, is one of the reasons why travelling is so difficult in this country; as this, coupled with the loose gravel and sand in which the feet of the animals sink, makes a wagon drag heavily; and already we begin to hear of resorting to packs. We passed to-day a remarkable mass of conglomerate, which had been

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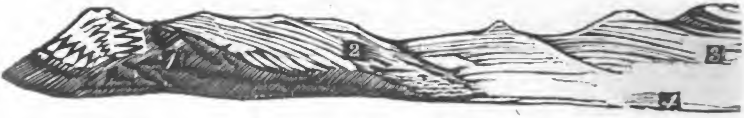
left when the hill it stood upon washed away. It resembled a house, at a distance, very much. From one of the hills, we could see the mountain of Albuquerque, 150 miles distant. We marched to-day about 18 miles, and crossed the river at a good ford,

into a remarkable bend, southwest of the Jornada mountain; wagons arrived about 5, p. m.; having gone about 11½ miles, a number of mules gave out in the teams to-day, indicating that our rate of travel must be very slow to reach California with wagons. Upon due consultation, the general determined to remain in camp, and send to Major Sumner for mules to take back the wagons and other property which we could not need in packing, and resort at once to packing as a means of transportation. This he resolved upon, knowing what he had passed over; and, upon the report of Carson, who represents the country as worse rather than better in front. Leaving, then, to Captain Cooke the task of opening a wagon road, he determined as above. A Mexican, Tones, and Corporal Clapin were despatched at midnight, and ordered to ride to Major Sumner before stopping—60 miles.

Sketch of Jornada mountain.

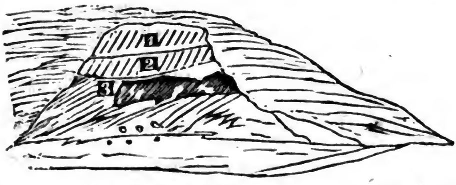


1. Volcanic. 2. Sedimentary. 3. Volcanic. 4. Chalky.

October 10.—Frost and ice in the morning; remained in camp; Santiago Ortz and another New Mexican came into camp with mules for sale, which they said they got from the Apaches in trading; as this is contrary to the laws of the territory, the general confiscated all the mules they said they had gotten from the Apaches, and sent them off. They said they knew it was contrary to law, and were willing to submit; the general gave them a paper stating what he had done, and the reasons for it; they then asked for license to trade with the Apaches, which was granted them; they asked leave to withdraw, and departed. Grass at camp not good.

October 11.—Ice and frost; the water of the river getting cold; the water is reddish, and does not settle as soon as that of the Missouri; visited a locality of rock resembling that of chalk in appearance, about two miles east of camp; it outloops at the base of the Jornada mountain, with a difference of ten degrees east under the mountain; it rests upon coarse sandstone, or rotten conglomerate, and underlies the stratified masses of the Jornada; a deep wash in the hill is walled with this white rock as an amphitheatre; it is in a full state so highly charged with lime, that, in times past, water has formed large masses of tafa in the crevices of the same rock and the adjacent ones in front of it; next the river, is a large mass of protracted black basalt; on the top of the higher hills, a mile

further east, and resting upon the superincumbent strata of the chalky substance, are large masses of lighter colored trap; near the



base of the black volcanic masses in the bed of the Del Norte, there rises a spring highly charged with carbonate of soda; in fact, throughout the valley of the Del Norte, soda effloresces on the surface of the bottoms, in many places perfectly white. In passing along the river, I saw the tracks of the otter, the catamount, the wildcat, the bear, the raccoon, the polecat, the crane, the duck, the plover, the deer, and the California quail. The latter differs from the quail of the United States: the male has a plume of black, and the female of reddish feathers, and the plumage of both has more blue in it than that of the United States.

October 12.—Laid in camp, wondering why our pack-saddles did not come; a wish was expressed for a parcel of Irish wheel-cars to transport our baggage over the rough country; the idea may be worth something; a wheel car is a horse wheelbarrow. All persons who have resorted much to packing for an army, know how destructive it is to animals.

October 13.—Lt. Ingolls arrived with the pack-saddles and the mail, containing general orders No. 30 to 36, and letters which required answering. We had already moved our camp across the river, to a camp with fine grama grass; we then stayed all day, and completed our work, wrote to friends, and closed the door to future communication with the States, as we will now pass into the Apache country, where it is probable no one will dare follow us.

October 14.—Marched at a quarter before 9, and got off pretty well, as we had almost a pack for every person; all were busy to the hour of starting, from the general down; but our pack-saddles were bad and our lash ropes worse; with a few cases of kicking and no accidents, we made our march down the river, (17 miles,) and encamped opposite to the mountain San Diego. The country passed over was the same pretty much as before. The mountain San Diego appears to be composed of strata upheaved, and dipping east, with a steep escarpment on the river; along its river face are seams of basalt; opposite to it, dipping south, is a locality of compact blue limestone, probably cretaceous. West of this is a small mountain with the strata dipping north, with a steep escarpment to the south; all this within five or six miles; about here our road was more broken than usual. The eastern part of San Diego mountain appears to be covered with cedar bushes; but at the distance we are from it, the best spy glass cannot distinguish them from volcanic rocks.

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October 15.—Marched at 8, and after four miles of rough travel-ling we turned more to the west, and took a final departure fro the Rio Del Norte: its rugged gravel hills and harsh bottom grass tasting of salt, has not made us regret leaving it. We ascende near two hundred feet at once, to an elevated plain, deeply cu with the cañons of this stream, which we came to, encamping o the third: these proved to be great obstructions, and would hav detained us very long if we had brought our wagons. The grave on the slopes of the banks was at an angle of about thirty degrees and it would be difficult to get a passage around it. The guide of Captain Cooke went to seek a crossing for these creeks nea their junction with the Del Norte. From the south bank of th third creek on which we encamped, no doubt a practicable wago road could be obtained to the banks of the Del Norte. The tab land is fine, and upon it a good route could be made. We entere upon a country to-day with many varieties of plants strange to us and of a more tropical aspect—a new variety of walnut, oak, hack berry, birch. The gravel beds of alluvion near camp have turne to stone, and a deep cut or cañon, of fifty feet deep and twenty fee wide, affords a passage for the stream on which we have encamped which, for a short distance, is a fine leaping mountain stream, wit overhanging trees and fish playing in its waters; it then sinks i the sand, and all is arid again. Distance 24 miles to one creek; 1 mile to second; 14 miles to third; 6 miles. Course SSW.; the trai is very plain.

October 16.—Marched at 8, and found ourselves approaching th lesser peaks of the Sierra de los Mimbres, and, passing throug them, we found the country very beautiful, with mountain stream at intervals of four or five miles all day, and a smaller growth o walnut and a sort of live oak shaded the rivulets; all else wa prairie covered with the finest grama grass. We occasionally foun the road rocky, but it was very good. The growth of live oak, i stunted shrubs, covered some of the mountain peaks to their tops others were entirely bare. The Mimbres chain to the west loo black in the distance as the vegetation. The leaves of some cot-ton-wood and grape vine, and other vegetation, were yellow in the October sun; the grama grass looks faded, but it is now in the seed, and furnishes fine food for our animals. There are two kinds o grama grass—the summer and winter; the first is now too dry fo much use as pasture; the latter may be said to be best. We passed limestone strata to-day, which had a dip east, and showed the ac-tion of heat; the limestone blue and compact. The hills appeare to be all scarped to the west, like the teeth of a saw. From a peak

two miles southeast of camp the view presented was very grand; and twenty to thirty miles wide, covered with grass lays below, the valley of the Del Norte widening to the south as far as El Paso,

the peaks of mountains standing around in the distance like the frame of the picture. It is evident, at a glance, that the lower part of New Mexico is by far the most valuable. Mountains near camp are composed of blueish basalt and amygdaloid; these rocky masses were seamed with other material, the courses of which could easily be seen from the difference of the vegetation upon them. A root like a carrot was found near camp, with a reddish juice, but noxious to the smell; live oak, walnut, three kinds of acacia, ash, (new variety,) willow, cotton-wood, grape vine, canissa, and Spanish bayonet; several new shrubs and sensitive plants. On the whole, the country looked more like the temperate zone than that of yesterday. Distance 17 miles; 7 southwest.

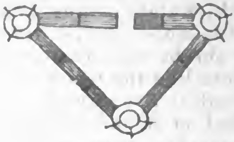
October 17.—Marched at 8, and entered still deeper the mountains; the hills, as yesterday, were covered with grass, and occasionally patches of dwarf trees; the streams small mountain rivulets, with a fringe of trees along them of oak, walnut, and little cotton-wood; saw various new plants, among which is a mountain flax, with tall stem and large seed, some of which I saved; passed masses of amygdaloid; at one place, a whitish amygdaloid had a dip of 20 degrees to the south; we then crossed a chain of mountain of darker volcanic rocks; then an immense deposite of conglomerate, composed of the fragments of the adjacent volcanic rocks, partly rounded by attrition; we then came to the Rio Mimbres, and crossed it, and encamped three miles from it, among hills of volcanic rocks, some of them capped with trap; near camp, a mass of volcanic glass; camp on little creek, among cedar trees and little water; plenty of grass; bad road for wagons, but a good one could be made.

October 18.—Marched at 8, making smokes on the hills to let the Apaches know we were coming, and to invite them in; the mountain peaks on the left of the road were capped with trap, and the trees more numerous and lofty; we are approaching the mining region of the copper mines, and abundance of fuel is provided; east of the copper mines, is a high cap of trap rock, of blueish grey tinge, and irregular columnal structure. This same

seam descends, and crosses the valley north of the copper mines; east of this is a dark seam of platonic rock, resembling in appearance Quincy granite, but of different materials; and in the valley west of the hill of trap, a whitish rock, seamed like marble veins, with the ore of copper, furnishes the great cobre or copper mine. It once was worked extensively, and the metal was so rich in gold, that it bore transportation to the city of Mexico for the fining furnace; the remains of the establishment consist of a quantity of adobe houses, and piles of charcoal, and ashes and drifts.

October 19.—Visited the copper mines, and examined the old excavations; the veins of sulphuret of copper run through a whiteish silicious rock, like the blue veins running through white marble; they vary in their hues, but traverse the whole substance; the rock breaks easily, and the pick appears to be the only tool used formerly. Occasional veins of pure copper, very yellow from the

quantity of gold it contains, traverse the whole mass. I saw in the bollers lying over the mine, masses of the blue limestone, supposed to be cutaceous; the water had filled many of the abandoned chambers of the mine; in others, the flies had perched themselves in great numbers, to pass the winter. The fort which was built to defend the mines, was built in the shape of an equilateral triangle,



with round towers at the corners; it was built of adobe, with walls four feet thick; the fort was still in tolerable preservation; some remains of the furnaces were left, and piles of cinders, but no idea could be formed of the manner of smelting the ore, except that charcoal in quantities was used; several hundred dollars' worth of ore had been got ready for smelting when the place was abandoned. McKnight, who was for nine years a prisoner in Chihuahua, made a fortune here, and abandoned the mines in consequence of the Apache Indians cutting off his supplies; at one time, they took 80 pack mules from him, (authority Carson;) the mine is very extensive, and doubtless immensely valuable. Water is abundant, and pasture fine, and many lands which will furnish breadstuff by cultivation; wood is very abundant, and particularly in the vicinity. Leaving the copper mines, the rocky masses soon show iron in the greatest abundance; then going west, we came to the blue limestone, standing vertical, ranging south, and bent so as to lay level west; through the seams of this limestone, some igneous rocks had been interjected, and occasional masses of iron ore, similar to that seen on the blue and false Wachita rivers; then we came to a mountain mass of the same rock as of the copper mines; from this, westward, we came upon an amygdaloid of all sorts of igneous or volcanic rocks; the hills were not very lofty, so that, gradually, we passed the great backbone of America without perceiving it—the dividing ridge between the Atlantic and Pacific. The general set out to march 15 miles, to San Vicentia spring; but, finding no grass, he came on, expecting to find water, a Spanish guide said, at three leagues, but it proved to be 15 miles further, where we all arrived after night. Before we left the copper mines, some Apaches showed themselves; and, as we came off, they rode upon a hill, made a smoke, and as we got opposite them on the road, commenced calling out to us "not to be afraid, but come on;" we replied, "it is you that are afraid; why don't you come on?" they then approached, but motioned us all back but the guide, (Carson,) until he had a talk, and satisfied them. Some of our mules gave out to-day; three Apaches came to camp. Distance, 30 miles.

October 20.—The Apaches came to us this morning, as we did not start until late. Red Sleeve came with fifteen or twenty per-

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sons—some women; they ride small but fine horses. The high roads leading from this mountain to Sonora and California show whence they came; they are partly clothed like the Spaniards, with wide drawers, moccasins, and leggings to the knee; they carry a knife frequently in the right legging, on the outside; their moccasins have turned up square toes; their hair is long, and mostly they have no head-dress; some have hats, some have fantastic helmets; they have some guns, but are mostly armed with lances and bows and arrows; their arrows pointed with stone points about this

size. Carson remarked yesterday, that he never knew how fine a weapon the bow and arrow was until he had them fired at him in the night; at that time they are more sure than firearms, for they are fired by the feel rather than the arms. The vegetation westward from the copper mines grows thinner until we get to the sierra Del Burro, which is a mountain covered black with forest growth. The pine is found hereabouts, live oak, (three kinds,) the grama grass, and other fine grasses, some resembling timothy. A rain storm passed by the heads of the Gila last night; it is the first we have seen since we left Santa Fé, although high winds and heavy lightning betokened distant storms once or twice before, we have not yet been sprinkled upon. Trading mules is dull work with the Apaches. Red Sleeve, Black Knife, and Lasady, are the three principal chiefs of the Apaches on the west of the Del Norte; Gomez is the head man of those on the east of the Del Norte. There is another band about southwest of this; on the Purgatory mountain is another band. The Apaches near Taos are of the same stock with these; their whole people have not been together for a long time. The general gave Red Sleeve and two other chiefs papers to show he had talked with them, and that they had promised perpetual friendship with the Americans; they seemed all anxious to conciliate the Americans; and they did not forget the Shawnees. The copper mines are in their country, which lies north of the thirty-second degree of north latitude.

Marched at 12, meridian, and descended a narrow, winding valley, with a brisk running stream two or three feet wide meandering through it, with a few trees occasionally, and very tall grass; we found two small patches where the Apaches had made corn. The hills were high on each side, composed of rugged masses of volcanic rock, and very few trees. We followed this creek for five miles, and fell upon the famous Gila, a beautiful mountain stream about thirty feet wide and one foot deep on the shallows, with clear water and pebbly bed fringed with trees and hemmed in by mountains, the bottom not more than a mile wide. The signs of beaver, the bear, the deer, and the turkey, besides the tracks of herds of Indian horses, were plain to be seen on the sand. We came down the river two and a half miles more, about south, and encamped at the head of one of its cañons, preparatory to a long journey over rocky hills to-morrow. Northward from where we struck the river is an open country lying west of a very high mountain, called the Gila mountain, in which it is said the salt

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forks also head. Our camp was well supplied with a fine fish from the river resembling a little the black bass; its flesh was not firm but very delicate. The California quail abounds in the bottoms. A new sort of sycamore tree made its appearance here; it has a bark precisely like our own sycamore tree, or button-wood, and a leaf resembling the maple; the leaves are now yellow with the frost, as they are of the most deciduous plants. Found some of the fruit of the black walnut of this country; it is about half the size of our black walnut, and not rough on the outside as ours, but shows the veins of the seams of the outer bark. The roses, the hops, musquitoes, and poison oak looked familiar, and some other plants known in the United States, names unknown. Just as we were leaving camp to-day, an old Apache chief came in and harangued the general thus: "You have taken Santa Fé, let us go on and take Chihuahua and Sonora; we will go with you. You fight for the soil, we fight for plunder; so we will agree perfectly. Their people are bad Christians; let us give them a good thrashing, &c." Marched seven and a half miles, and encamped at the upper end of a cañon, through which we could not travel to-night; grass good.

October 21.—Marched at half-past seven, and, going down the river a few miles, we commenced climbing a rugged mountain of basaltic rock, where our mountain howitzers will find trouble in climbing; for seven miles our track lay over the mountain, up and down steep declivities. At one point we had a magnificent view down the Gila, which lay before us, running southwest. At a long distance south, the horizon was limited by mountain peaks between us and them, and to the limits of the horizon until we came to the Sierra Del Buro, southeast there was a vast plain of diluvion covered with grama grass. This plain connects with that of the Del Norte, so that one can ride south of the Sierra Del Buro from the Del Norte to the Gila without crossing a single mountain. In passing the mountains to-day we encountered the usual basaltic rocks, then sienite, then basalt, then feldspathic granite, then red sandstone, (small specimen;) this was standing northwest to southeast, vertical across our route, and a cliff overhung us, probably of the same rocks, with a dip to the northwest, dipping from the Sierra Del Buro; then to feldspathic granite again like that of the Wishita salt, very easily disintegrated. The live cedar and a tree resembling oak on the hills, but scattered; grama and other grasses quite abundant; saw one deer and one flock of partridges; saw a dwarf species of mulberry on the hills; the miseltoe abounds; also, the sweet cotton-wood and willow thinly scattered along the river; very little brush in our way. The poison oak must be for some wise use, for it grows here too. A sort of wild squash, which grows from Bent's fort to Red river, is also found here. Our mules begin to show symptoms of failing. We passed to-day very little land that would bear cultivation even by irrigation; the upland is gravel and sand, the bottoms a sort of volcanic dust, made very loose by the undermining of myriads of rats and mice of new varieties. Caught two new kinds of fish in the clear waters of the Gila, baiting with grasshoppers. Our howitzers did not get up this night,

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Lt. Davidson being in charge of them, lay out at the base of the mountains; after dark, one of his howitzers and a mule rolled down a steep declivity and disappeared in the dark in a ravine, where he had some difficulty in finding them; it was, however, uninjured. Camp on plenty of grama grass; distance 18 miles.

October 22.—The howitzer arrived, and we marched at 10, crossing the Gila several times, as we move down it for four miles; we then crossed it, and made a circuit of 14 miles to the south side, to get around a cañon through which the river flows; our road was bad, from the number of gutters cut deep through the diluvion, of which the whole country, except the mountain peaks, is composed; it forms the substance of the plains of the Del Norte and the Gila; and, from its general level, no doubt, was deposited in the bed of an ocean. We passed a number of smaller mountains or hills, apparently composed of black basalt; and the cañon of the Gila here is caused by a seam of it crossing the course of the river, through which the water has cut a way; under this seam of basalt, there lies a succession of white sandstone rocks, with a dip to the north, and incurved east and west. The character of these rocks is the same as that which occurs on the Del Norte at our camp on the 11th October; and in general the formation of the country, so far, on this river, is similar to that on the Del Norte. The vegetation, today, is more of a tropical character: the large prickly pear, with a tree-trunk six or seven feet high, made its appearance; a new shrub made its appearance; it appeared to be without leaves, and looked like large bunches of the green thorn which defend the trunks of the young honey-locusts in Ohio; it bore a smell like blackberry; there were two new varieties of cactus on the road, and the Spanish bayonets grew in great abundance; encamped on the bluffs, 180 feet above the water, the grass being scarce in the bottom. Distance, 18 miles.

October 23.—I went back after my mule, which old Rob had let get away from him; found it by travelling where we left the Gila yesterday; discovered that the diluvion is formed into stone on the banks of the Gila above the cañon, forming perpendicular walls, upon which, for 30 feet above the level of the stream, the action of water was plainly visible; returned to the old camp, and slept; the troops moved at 9, and continued down the river, on a good road, coming into a plain with the salt grass upon it; the road side was strewed with pieces of broken pottery, which led to examination, and the evidence of a large village was plain; one foundation was found, 80 feet by 40; a *fleur de terre;* and there were piles of round stones, which had been used in former buildings; the place must have been occupied for a long time, as the quantity of broken pottery was very great; the fragments were apparently just like those in the daily use of the present New Mexicans; I followed here to overtake the troops, and did not have time to make any searches who it was that occupied these places. Was it Spanish or the Aztecs, *quien sabe?* The buildings of adobe do not remain long as ruins; perhaps they were Spaniards, who worked mines in the neighborhood, and were subsequently driven out by the Indians, as they

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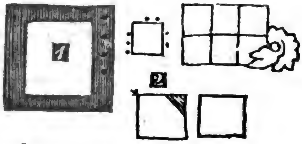
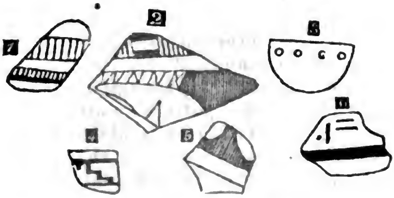
were from a silver mine west of Santa Fé. The country is not much frequented by Indians now just along here, as Carson left some horses and mules, and found them here.

October 24.—Laid by in camp, the salt grass purged our horses, and gave some of them the cholic.

October 25.—Marched early, and made about 25 miles, over a very rough country approaching the third cañon of the Gila and San Pedro mountains; the black hills of basalt rise on each side, and deep cuts in the diluvion makes the country very rough; some vallies on the Gila are capable of cultivation, and at them found the ruins of a number of habitations. No 1 represents a ground



plan of the most northern, six miles out from camp. The outlines of the foundations were visible, as round stones had been used for that purpose. The houses, probably made of adobe, were long since washed a *fleur de terre*. The longer house was shaped like those of New Mexico in present use; the smaller ones had the appearance of some of the assemblages of houses occupied by the Pueblos of New Mexico. In the longer house were some cedar pieces of posts and joists, very much decayed. How long cedar would last in this dry atmosphere, I cannot tell; but presume if even exposed to the weather, it might lay like a stone for ages. Pieces of broken pottery strewed the ground in every direction, and fragments of black crystal, which no doubt were left from the manufacture of arrow points. The pottery seemed like that in present use among the New Mexicans. I raked the dirt in various



Pottery.

directions, in vain, to find some relic which might indicate the autiquity of the ruins; a number of broken stones to pound corn upon, showed that the people were agricultural. In the bottom was the ruins of a small house, probably used for guarding the fields. No. 2 represents a place two miles further down the river;

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here there were fragments of broken pottery more ancient looking; one square room, with another house attached, with a hole in the ground within the foundation, about 20 feet square and now about eight feet deep; its only present inhabitant was a strange looking yellowish grey rat, which retreated to his hole; could I have followed him through his burrowings, I might have found some clue to the mystery of the former inhabitants. We soon after commenced approaching the third cañon of the Gila, and climbed monntains over paths which once had been used by this people. We diverged from the river again, and, after much rough travelling over broken volcanic rocks, we found a camp of grama grass about 400 feet above the river on a towering hill, with rough descent to the water: distance travelled about 20 miles. A horse which Carson had left here a week or two before, as he came from California, took fright at our approach and fled to the hills at the top of his speed, baffling all effort to retake him.

October 26.—Started at a quarter to 7; as we are warned of a troublesome march, it commenced as we descended to the river, and continued for about 14 miles, up and down steep declivities covered thick with fragments of black basalt, with scarcely a place where an animal could step without putting his foot on a loose stone, many of them angular and sharp. This terrible journey we had to take to get around the third cañon, which is impassable. As the van toiled along, rising hill upon hill, the rear fell behind, until, finally, they were lost to view; the hea l of the column reached the river about 3 o'clock, and at midnight the cattle and howitzer party came, Lt. Davidson reporting that his men and mules had given out, and had left the howizers 5 miles back; some of the men did not come in until morning. At daylight (27th) we saw one of the dragoons perched on a cliff, with his kit on his back, just abandoning his mule, which he had led down towards our fire the night before, and found himself cut off by a precipice, he laid down and spent the night; and the next morning, not being able to get his mule back, he took off his saddle and retraced his steps with all his effects upon his back; the general had a party sent and rescued the animal from its perilous heighth. This journey can no doubt be avoided by leaving the Gila higher up, and taking more to the south around these basaltic peaks. The action of the water on the diluvion drift was plain for 500 or 600 feet, the pebbles for 400 feet, or thereabouts, being of varieties from a distance mixed with those of the locality; higher up, the stones, rounded by attrition, were wholly those of the locality. The hills were of conical form, piled upon each other; one of them with a cap of trap; all seemed to be solid basalt thrust up from beneath; a very few cedars and other shrubs; several large kinds of caste and grass tuft between the rocks was all the vegetation, the grass growing finest on the north side of the hill. Having passed this rocky barrier, we find the grass scarce; the hills are green with the creosote bush; and, from this on to California, we may count upon but scanty picking for our poor animals. It is not improbable that in the volcanic convulsions which

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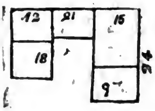
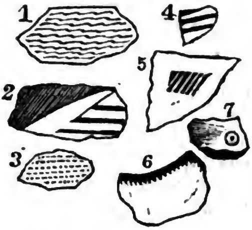
gave this country a form, some mephistic substance was produced in quantities to poison the soil for vegetation. This creosote plant shows something; and a shower of rain which fell upon us, although very slight, made the atmosphere smell of some vile gas. Opposite our journey, the Black and Blue rivers come on the north-eastwardly; the Black courses south, with a branch in the mountains called Bonita; the course of the Blue southeast: they head in the mountains north of the Gila, and may be 60 miles long; they come into the Gila about six and a half miles apart. Near our camp a small stream called the St. Charles comes in; all three of these streams flow through cañons. The diluvion here is very thick, and of a rocky nature, which, with the basalt, make the walls of the cañon vertical. Near our camp are old horse signs and trails, and old Indian wigwams of willows about 5 feet high, and covered with willows and grass. Near where we left the Gila to-day was the ruins of two ancient houses, shown only by the foundation stones and the pieces of pottery. If I only had one of the young ones that had been boxed on the ears for some of the breakages!



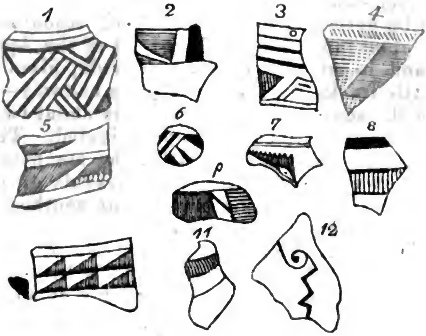
October 27.—Laid in camp on account of the fatigue of yesterday to the animals, and to get up the howitzers; near camp is an old ruin; the foundation of the building is as those given above; some



quantities of broken pieces of pottery were lying about it; I got two men and some spades, and dug about it, in hopes of finding something, but found nothing but pottery; it appeared to be very ancient.

October 28.—Marched at a quarter before 8; after coming two or three miles, we found the remains of an old settlement, the foundations of the houses covering a larger space than those before seen, but the plan of the houses only to be discovered by the rows of round stones; abundance of pottery; the place was overgrown with mesquite and chimezo; the rooms from 12 to 20 feet in dimensions; about 6 miles from camp, were other houses, the rooms of which—

ome of them—appeared to have been round; a little further, and here was a circle of stones 90 paces in diameter, with an opening o the east, with the remains of a house near the centre, and some oundations outside; there were no remains of wood; a mile further, nd remains of very extensive buildings were to be seen; the ooms—some of them—appeared to have been 40 by 50 feet; and, rom the greater quantity of rubbish, the houses must have been auch larger; the pottery abundant; pieces marked thus. Further



on, we came to a large plain at the junction of a creek which comes rom the southeast; and here was found the remains of the most extensive settlement; the most of the houses had cedar posts in a state of decay, standing in the ground; a rampart had been raised n a circle of over 300 yards, and on parts of it, houses had been made; in the middle was a hole with three entrances or slopes down o the bottom of it; probably an old well filled up, as the surface was probably not over 15 feet above the level of the river; pottery very abundant; our road lay along the course of the Gila, which we crossed several times; the road was very dusty, so that our mules dug great holes as they stepped along, one after the other; the tracks of a Mexican cannon were plain to be seen on the trail we were following; some expedition last spring, probably against the Apaches, to the southeast; we can see a level country passing south of the Devil's turnpike; the creek coming from that direction can probably afford water; south of southwest of our camp is a high mountain, about five miles off, the top covered with trees; around the southeast base of this is a broad trail leading towards Sonora, where the Apaches go to steal; it leads across to the head of San Pedro. Our route showed the action of fire in the bottoms, which, in many places, had swept the growth of vegetation off, for years of what the earth had attempted to clothe herself with; the soil is so light, that fire kills the roots, as well as the tops of the trees; mesquite is abundant on the bottoms; and here it is a large tree, two feet in diameter, but not lofty; grass was scarce on our path, so that we had no place to camp except here; the grass coarse, and of

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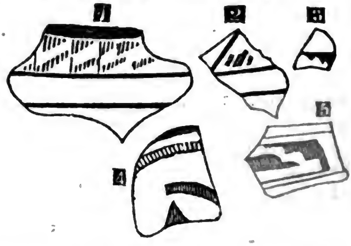
the salt kind; several Indian trails crossing our path showed the presence of the Apaches. The Gila is getting to be much larger—still not deep fording. Distance, 21 miles.

October 29.—Marched at 10 minutes of 8; kept on the south side of the Gila all day; about eight miles out, we passed the mouth of a stream seen on our left yesterday; it was dry, but at times it contains a good deal of water; its course is marked by cotton-woods; at only two or three places could a camp have been found; all salt grass; about twelve miles, there is a level plot of salt grass running down to the river—enough for thousands of animals. All the country seemed to be perishing for want of rain. About five miles from camp, we fell upon the great stealing road of the Apaches; it was hard beaten, and in places many yards wide, filled with horses, mules' and cattle tracks, the latter all going one way—from Sonora: the bottom on the south side of the river is about two miles wide: along here, for 40 miles, it could all be irrigated. There is a large quantity of cotton-wood along the Gila; the mountain peaks stand along the river on each side, with long intervals of comparatively low land between them; looking back to the southeast, a vast plain is seen south of the turnpike, through which we might have evaded that horrible journey. A wild mule paid the column a transient visit, but eluded pursuit, and fled to the hills with the swiftness of the deer. We have had the best road to-day of any since we left Santa Fé. Pottery in abundance; but all the houses were gone: probably they used no stones in the foundations. Distance 21¼ miles.

October 30.—Marched at a quarter before 8, and continued on the Kiataro trail down the Gila; at 10 miles, we halted to noon on the south side (left bank) of the Gila, at a good grass plat. On a hill of the usual diluvion, of 50 feet above the level of the river, with a steep ascent, was the ruins of an ancient dwelling; the rooms marked by the foundation stones of round volcanic rocks, from one to two feet in diameter. I found a shell in the ruins, which had been perforated, and worn as an ornament, besides many pieces of pottery; the rooms were square, of the usual size of 12 or 15 feet; near the house, a stone was found, about two inches by an inch and a half, which had been painted red; it may have been used as the foot of an idol. The pottery was marked. We continued our



march, after our usual halt of an hour; and after crossing the Gila five or six miles, we came suddenly upon two Indians, old fellows,

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rivelled up and purblind; they had three horses pretty well
cked with something, and a quantity of material for arrows; they
re fairly caught by surprise, and were very much frightened; we
ve them tobacco, and tried to get them to come to camp with us,
t the old fellows made a very eloquent speech, which we could
t understand, and pointed earnestly for us to go on, and let them
their way; we left them, and got to camp about three o'clock;
stance, 22½ miles, thinking they would pass along our column to
e rear; but they marched themselves instantly; they are of the
ilend's Gila Indians, or Kiataws, (prairie wolves,) as they are
cknamed; from them the river takes its name. The valley is nar-
wer to-day, but no doubt once supported a large population;
mp good on the left bank; signs of rain in the dry creek.

October 31.—Marched at a quarter to 8, having sent Carson off
7, with four dragoons, to explore ahead the route. As he, on his
ute from California, made 60 miles to a point 8 miles up the San
rancisco without water, we take an Indian road nearer the Gila,
d hope to shorten the distance without water. After marching
miles, we halted on the San Francisco, right bank, where we
ally encamped. Carson reports that we can make seven miles
ore on the river, and must then bear off, to avoid the cañon No.
; after we had concluded to camp, some Gilands made their ap-
earance on a distant hill, and made signals; we called them, and
nt messengers to them; waived a white flag; our messengers,
aptain Moore and Carson, shook hands with them, but they would
ot be induced to come to camp; they have been dealt with by
mericans in the employment of Chihuahua, who have hunted them
t $50 a scalp, as we would hunt wolves; and one American de-
oyed a large number of their brethren in rear of a wagon to
rade, and fired a field-piece among them; it is no wonder, then,
hat two parties of God's creatures, who never knew each other be-
ore, should meet in a desert, and not approach near enough to
hake hands. It would be well for us to get them to us, as we
night buy some mules; ours are flagging; and we might get water-
guides in the 60 miles in front of us. Remains of pottery at camp;
beaver dams in great numbers in the San Francisco; flags and wil-
ows along the borders very thick; some larger cotton-wood; the

tap-root of the pumpkin of the plains, three feet by six inches; perennial, apparently.

November 1.—First day of winter; it came with a freeze, making ice half an inch thick, and reminded us of our giving up the route by Albuquerque, in consequence of fear of snow on the Washitah mountains; marched at the usual hour, quarter to 8, and crossed over to the Gila again, eight miles to upper end of the cañon; here we halted to water and refresh before taking the journey which Carson found to be 60 miles, without water; near this point, there was evidence of a former settlement, but nothing but pottery; their pieces of pottery are very ancient in appearance;

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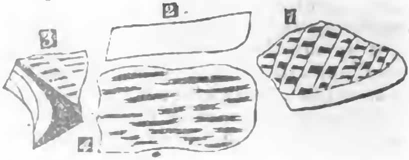
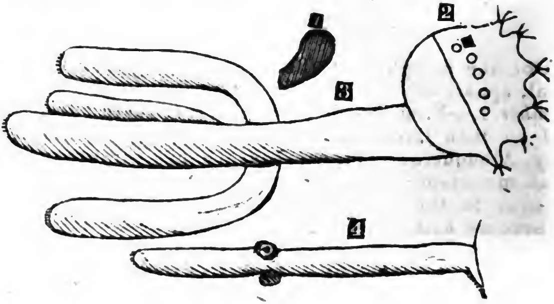


from the camp to the upper end of the cañon, the grass was very fine grama, and will furnish at any time fine camps for any number of animals; the grass along the edge of the water on the river grows in a thin stripe very luxuriantly; there is usually a thicket of willows, about 10 yards deep, along the borders of the stream; then in the bottom, which is subject to overflow, cotton-woods grow of two and three feet in diameter; this strip is usually 200 or 300 yards wide. We commenced at a quarter to 11 our passage of the hills on the north side of the cañon. Our ascent was rapid, and by an Indian trail; the road very rough. After marching ten miles, we found a spring high up the mountains, where we watered; and going three-quarters of a mile further, we encamped. One of the howitzers got broken on the road, and three mules gave out in them. Lieutenant Davidson and party came in some time after dark, and reported that he had been obliged to leave them four miles behind him. A party of six men was sent out to guard them until to-morrow, and measures taken to have them brought up. The formations near the mouth of the San Francisco, and to the upper end of the cañon, are diluvion, fast turning to stone, overlaying sandstone and limestone of late formation; below this, the black basalt appears in seams and caps among the hills, also, to the northwest, we came upon granite, (mostly feldspathic,) seamed with basalt in dykes, and intermixed occasionally with other igneous rocks, some indicating the presence of iron in large quantities; near our camp an outcrop of dark-colored slate, capped with pudding stone, which changed to a silicious state—the same substance which forms the cement of the pudding-stone; this pudding-stone would probably make a fine millstone; the dip of the strata is very deep to the west. The vegetation to-day was novel: the cactus



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(pitahaya) made its appearance; it bears a fine fruit, and is sometimes 30 feet high, has 15 flutes or more, is 2½ feet in diameter, and has an interior structure of hard wood—one for each flute. The agave Americana made its appearance; it bears a fine fruit in the season. The muscal of the Mexicans had bloomed in many cases this year, and died, having fulfilled its century of probation; it was the emblem of 100 years in the Aztec picture-writing. The snow was visible on a mountain 35° east—probably a mountain at the head of Salt river. Southwest from Zuni, a route is said to be open from near this point to Zuni and Cibolletta. A view from the hill-top south shows a plain probably beyond the San Pedro, which probably unites with the low divide between Mount Dallas and Mount Barbe.

November 2.—Some Apaches (Pinoleros) showed themselves on a hill-top early this morning, and made signals of a desire to hold council; after a good many efforts, one was got into camp, and given some presents; then came another, then another, then another, and another, each of whom, in turn, got confidence that we did not design hurting them; they promised to bring a number of mules to trade with us, and furnished a guide to bring us to water six miles further on our journey, where we agreed to move to, and meet them to-morrow. They seemed to be poor in worldly gear, but are fat enough; they are small men, but finely knit and well muscled, especially in the legs. Our camp has been one of their hiding-places, and they find a secure asylum in these rugged mountains. The high peaks afford fine points for look-outs, upon one of which is always seated one of their number, like the sentinel-crow on the highest limb of the adjacent tree, watching over the safety of his thieving fraternity; their wigwams scarce peep above the low brushwood of the country, being not more than four feet high, slightly dug out in the centre, and the dirt thrown around the twigs which are rudely woven into an oven shape, as a canopy to the house; a tenement of a few hours' work is the home of a family for years or a day; like the wolves, they are ever wandering. The costume of our guide consists of a small cap of buckskin, tied under his chin, covering only the top of his head; a cotton shirt, with no sleeves, upon the back of which he had plastered some yellow paint; then the dressed skin of a black-tailed deer, thrown over his shoulders; his breech-cloth of buckskin, leather leggings from his knee down, connected with his moccasins, forming a sort of boot; a powder-horn over his shoulder, and a pouch belted around his shirt, a fine dun horse and Spanish saddle and bridle, and a gun in a leather case; his hair was long, and had a knot behind like a woman's; his moccasins, as usual, square-toed and turned up; his thighs, which were bare, bore many a scar from the thorny bushes of the country. We broke up camp, and followed our guide about six and a half miles NNW., and found a good camp in a grove of sycamore, with a little water which rises and sinks again within 100 yards. We passed a new species of cactus to-day, a sort of bush with slender stems, similar to one seen on the Del Norte. As usual, when we found one, we found others, a single specimen being not yet met

with. In travelling over this region, as well as all prairie countries, the most casual observer is struck with the gradations in the classes of plants, and will instinctively, almost, find himself making inquiries of a botanical sort of his own; the cacti stand alone; but they, in one extreme, approach a shrub; the other, a fungus. The agave stands at the head of its species, but follow it down, and it will be found of different sorts, until one appears scarce distinguishable from grass. The acacia, from the thorny bush and mesquite, to the sensitive plant, exhibits the same general characteristics. Step a little further, and the infinite variety of the bean and pea stripe show analagous characteristics. All the plants and grasses of this country appear to have a thorny defence. Why they are so protected, I cannot yet discover. No doubt the wisdom of Providence is shown therein. White and blue limestone* dip W. Distance, six miles.

November 3.—The sun rose as usual upon a clear morning quite cool; after breakfast the Pinoleros came in with a few mules, which we bought, at the rate of a blanket, three yards of domestic, a knife, and looking glass, for a mule. Animals are cheap to people who steal all they have; and they have very little use for them, except to eat, as their country is too rocky to need their animals much to travel about. They brought with them a handsome Spanish boy, taken from his home several years ago; he seemed contented; his master said he liked him too well to sell him, upon the general's offering to buy him. They brought some of the cooked muscal to the general; it tasted something like sweet pumpkin baked, and looked very much like it. Our camp is situated in a deep ravine, with a narrow bottom on the creek; the hills steep on each side, composed of the diluvion of one hundred feet thick, which is composed of the boulders of the rocks which form the adjacent mountains, cemented by silicious sand and lime. The blue and white limestone are specimens of what we found yesterday, containing enimity and other fossils. A squaw had some crystals of metal of yellowish color, but rated them too high for purchase. There is a fine silver mine, it is said, on the San Pedro. The old squaw came into camp arrayed in a light gingham dress, trimmed with lace, no doubt the spoil of some Sonora damsel, who had put all her industry upon this, her fandango dress. The old woman had no pins to fasten it behind, so she soon stripped her arms and breast of the encumbrance, and rode out of camp in a red flannel shirt, which she had got in trade from one of the soldiers. Our howitzers got up this evening perfectly dismantled. Captain Moore set to work and contrived a new coupling, so that we hope to get along better; they have been a complete drag upon us so far. The small wheels are good to prevent upsetting as far as may be, but the smaller the wheels the greater the friction, and a small stone

* Part of this limestone is a busira, containing small fragments of slate and other rocks in small pieces, which would make a beautiful marble. The whole of the stone is very compact. In a boulder of the sandstone lying loose, I saw a central stone, which appeared to have accumulated silicious sand around it before becoming incorporated in the bed of sand. Opposite to the points, the layers of accumulation were thrust.

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is a great obstacle. The road we had to come is perhaps worse in some places than they were expected to have been taken over; they have several times rolled off a steep place, carrying the mules with them down the hill.

November 4.—Marched at 8, and took a southwest course, gradually ascending until we could see far over the country to the northeast; the snow-capped mountain was thus to be seen, and at its base it is said there is a route from this place by which the Kiateros go to Zuni. I have been informed that the expresses of the president of Lucson once were in the habit of going to the lower settlements of New Mexico in ten days, probably to Zuni or Cibolleta; the route would probably be northeast from this position. Lucson is about ninety miles southwest of the mouth of San Pedro. We, in our course, within a few miles, passed green hollows between the hills, containing a scattered growth of sycamore, oak, willow, cherry, musquit, senna, cacti, agave, hackberry, ash, walnut, zala, cedar, pine, a dwarf black gum, grape vines, various kinds of grass, lambsquarter, (the seed of which the Indians eat,) squash, and sundry familiar weeds, all showing the signs of autumn, except the live oak and evergreens; scarce any flowers to be seen, all being gone to seed. About six miles from camp we found the rocks outcropping, dip 30 degrees southwest, granite below, with large grains, and entirely disintegrated, and one part of it containing small morsels of other rocks imbedded, then the puddingstone with round imbedded pebbles about the size of goose eggs, cemented by silicious sand, then black slate; then sandstone, then compact limestone, forming uneven cliffs to the northeast, giving a slope of 30 degrees southwest; on these hills there was a good deal of timber. Our road was rough and rocky; about 12 miles we came to a place where Carson had slept when going up; there we got water enough to drink by scraping the sand; here our howitzers were directed to spend the night, and we pushed on to the river, 12 miles further. Six miles from the river we fell into a valley of a dry stream, which gave us a good road down to the river; here we fell into another Indian trail, larger than that we were upon; both were fresh signs of cattle lately driven from Sonora. These Indians have now been 17 years living by the plunder of Sonora; when they are required to stop, it will require either money or powder to make them obey. Along the road side we observed in many places that the grass had been burned in little patches; this occurred all along the road: why the cause of it is unknown, probably signals. As we approached the river again, several new species of plants showed themselves; a new cactus, a new variety of the Spanish bayonet, and others of nondescript character. On the Gila we found a few sprigs of the cane. The diluvial beds we first came to as we left camp occur again on the river in their usual thickness in places surmounted by trap, which here again makes its appearance. Where we strike the river is still in the cañon, but below us it is practicable for the wheels; we went up stream half a mile here and found a camp of scanty grass.

November 5.—Move at 9, and conclude to seek a better camp lower down; our road was still the Indian stealing trail, which we

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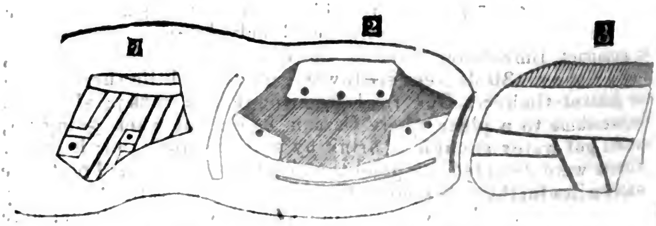
followed down the Gila through the cañon for four miles, crossing the river repeatedly; the high water mark was frequently above our heads on the rocks. There was very little grass in the cañ a little cane. The road left the Gila on the left bank, and led a dry ravine east of south for five miles further, it then brought us by the Saddle mountain, in sight of the San Pedro; course northwest. We then marched on and encamped on the left bank about one mile above its mouth, on the border of the low hills where we found plenty of grass; four miles further, the rocks of the Gila were diluvial as we started, thence blue, grey, and variously colored basalt; in one place coarse amygdaloid, all with an apparent vertical seam; the rocks generally very compact, with many cracks and rugged surface; a few of them soft and pulverized. On the hill four miles from the San Pedro was a bed of greyish white limestone, then commenced the diluvion again. On the top of the ridge stood the Saddle mountain, capped with some rock—probably the limestone—but it may be the basalt. The bottom of the San Pedro is one mile broad, and of the character of those on the Gila above, dusty dry soil, grown in places with cotton-woods and willow, in others with grass, and again mesquite, chapparal, other places bare. It bears the usual signs of habitations of former times—abundance of fragments of pottery; I also found the fragment of a cerulian sea-shell. The vegetation of to-day was the



same, much as yesterday; saw some deer, abundance of quail, some ducks, and a pole-cat, and a number of geese and grey rabbits, like those of the United States, but apparently small, and the large grey hare, with black tail and ears.

November 6.—Remained in camp, awaiting the arrival of the howitzers; obtained some seed of the pitahaya, which were contained in a dried fruit pod two inches large; the hills of diluvion are cut into an infinite number of hollows, on them the cactus and the various kinds of acacia grow in a scattered way, covering one-tenth, perhaps, of the surface, the rest is bare gravel, except one-tenth more, which is taken up with the scattered bunches of grama grass; under the base of these hills the mesquite grows thick for a hundred yards, some of it being trees of two feet in diameter, but low in altitude. Then comes the bottom of the river covered with coarse grass, which abounds on the bottoms of the Del Norte; then comes the willows a few yards, which stand thick along the

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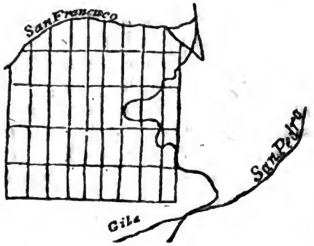
water in many places, but not more than 12 feet high; the cottonwoods are generally a foot or more in diameter, in irregular groves, not more than 100 yards wide along down the river; the higher hills in the back ground on each side look half green with the bushes of the creosote plant, and the mountains here are apparently almost bare; the peaks visible from here are not very high. Our route for the last few days has been very crooked, so that had we a straight route, we could have come through the cañon in two days, or one and a half instead of four. The chain of mountains continue along on the right bank of the Pedro, so that there would be rough hills to cross from this point to the gap between the Mount Dallas and Mount Dick.



November 7.—Marched at 8; kept down the left bank of the San Pedro, and crossed the Gila three miles from camp; near the mouth of the San Pedro is a good patch of grass. We kept down the right bank of the Gila until we entered the fifth cañon, where we crossed it frequently, and encamped on its right bank, with scanty grass. About six miles below the San Pedro we passed a good camp under some diluvial cliff; here, we are told, is about our last grass from this to California. The river is slightly larger here than where we first saw it, although we were told otherwise; it has about 18 inches water on the shoals here, and canoes might pass down it very readily, and good sized boats, if it was not for the round rocks in its bed. The San Pedro, an active man could jump across. Our course was a little north of west; distance 18 miles. The mountains in peaks, composed mostly of basalt, came near to the river; the diluvial beds, indurated into rocks, are torn and broken in every direction, indicating great violence and irregularity in their displacement. There appears to be a subsequent bed of diluvion along here not yet displaced; the bottoms of the river are composed of the usual clay, in a state of powder or dust, and which is undermined in every direction by animals of the rat kind, so that it is unpleasant to man or mule to ride off the beaten track. Along the very edge of the water of the river the grass and other verdure grew luxuriantly; on all else the vegetation was as usual, the mesquite and its kindred plants, and the creosote covering the mountains to their tops; no trees visible on the mountains. Signs of the wild hog, and the deer, and the turkey were numerous; the

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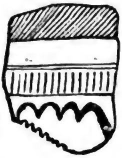
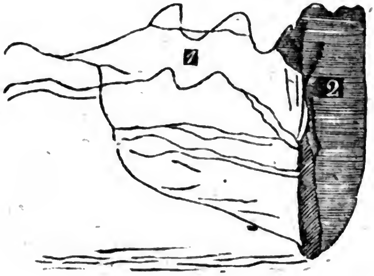
wild goose and the raven, (our constant companion,) the red bird, the quail, and a small bird resembling the ortolan, the butterfly and the grasshopper were about all the animate objects we saw. Some Apaches from the neighboring mountains came to a tall top and hailed the column, and Captain Moore succeeded in getting them to camp; they could talk but little Spanish, and appear to have a vernacular different from those we have seen before; they dress partly in Spanish costume. One of them told me the hole in the point of the toe of their moccasins was to let out water; they encamped with us, not forgetting to beg tobacco. Our road to-day was strewn with pottery as usual, wherever the ground looked as if it could be irrigated. The pottery was mostly plain red earth; occasionally a piece was seen black and white, similar to those on the San Pedro; I could see no foundations or any other certain traces of houses. Our road was an old Indian trail all day, and, from some point along here, by striking to the San Francisco, the hills of 2d November and following, may be avoided; water may be wanting; but these Apaches point to the hills on the north side of the Gila as their homes. The country within six miles of the mouth of the San Pedro and down the Gila to this point contains about 16 sections of land, which, by irrigation, would produce well; the hills afford but a very scanty pasture.



November 8.—It rained quite hard upon us last night; the general gave orders to start an hour later to-day, that the men might have time to dry their blankets; as they are without tents, of course they were very wet. Marched about 9, taking leave of our Apache friends, who promise to bring mules to our camp to-night, to trade for blankets, &c. Our route to-day led down the cañon—a road impassable, of course, in high water, as we had to ford the Gila some dozen times. The most of the way, the hills or mountains on each side of the river were composed of a beautiful granite, seamed with basalt, (or trap dykes,) and seams of quartz; in places, too, the granite contained layers of foreign matter, either caused by a different aggregation of particles, or actually a foreign stone, imbedded. Our direction was pretty near west; as we progressed, we came to the diluvion again, composed, as usual, of fragments of the adjacent rocks; in places, it was much upheaved; in others, it had not hardened into stone, and rested as it was deposited; the caps of the hills near the west end of the cañon, are of basalt, in some places apparently resting upon beds of diluvion. We marched only about 14 miles, and encamped at the last grass on the road from this to California. They tell us there is none; this is very scant, and could not well be worse. We passed several places today, where we could get as much for our animals as here; and there is an old trail down the cañon. Near our camp, we found broken pottery, but none ornamented—all red. There is but little ground in the cañon capable of producing any grain by cultivation. Our camp is on the right bank. Before, as westward, is a high and peculiar hill, capped with basalt and with precipices; on the north

and south side, sheer perpendicularly many hundred feet. The mountains, in every direction, are shapeless ravines of igneous rocks, with scanty growth of low bushes covering their sides, and grass apparently wanting. The badger, the raven, the duck, the goose, the deer, the rabbit, show their signs. We met a terrapin to-day, which is probably the terrapin gopher of the south of the United States. In our camp is the remains of some habitation, pottery, &c, and the ruins of an eliptical wall, 72 by 48 feet, nothing remaining but the round boulders, one and two feet in diameter, which formed the base, probably, of the wall. Distance, 14 miles.

November 9.—Marched about 8, and passed the end of the cañon through an opening in the rocky hills truly grand. On the right and left, the cliffs overhung us hundreds of feet, composed of basalt on one side, and amygdaloid; apparently, the diluvion affected by combining with some other substance, and appeared to be an angle of 45° dipping east; the mountain on the left bank was composed of this, and the seams in it showed the exertion of a remarkable force. In one place, a crack in the mountain had formed a wedge-shaped mass, which had slipped down in the opening crevice, and was perhaps 50 feet below its proper position. West of it was a



peak of basalt, and on the right bank of the river granite made its appearance, but in low hills. After coming out of the cañon, the signs of former occupation increased; an extensive plain country opened upon us, which extends, probably, to Salt river, which is about 15 miles north of here. About 12 miles from camp, we came upon a fine spot of grass, one mile from the river, where we nooned; all the rest of the plain was naked, except the mesquite, creosote, and other bushes, which covered perhaps one-third of the land. About our nooning place, the vast remains of a settlement commenced, which reached to our camp, three miles; the ground was

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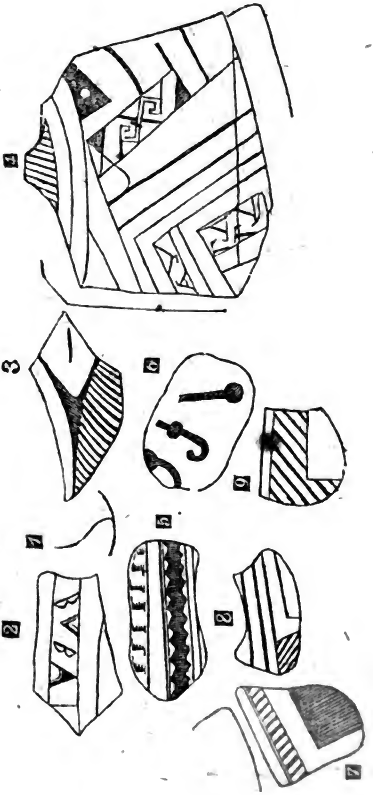

strewn with pottery. The camp was near a vast profusion of pottery.* I found a beaver tooth on the ground, and remains of sea-shells; the ground about the houses is always strewn with broken pieces of flint rocks, of a few inches in diameter. We encamp in soda grass, quite abundant, running a mile or more along the direction of the road.

November 10.—Marched about 8, and after marching six miles, still passing plains which had once been occupied, we saw to our left the "Cara de Montezuma." I rode to it, and found the remains of the walls of four buildings, and the piles of earth showing where many others had been. One of the buildings was still quite complete, as a ruin. The others had all crumbled but a few pieces

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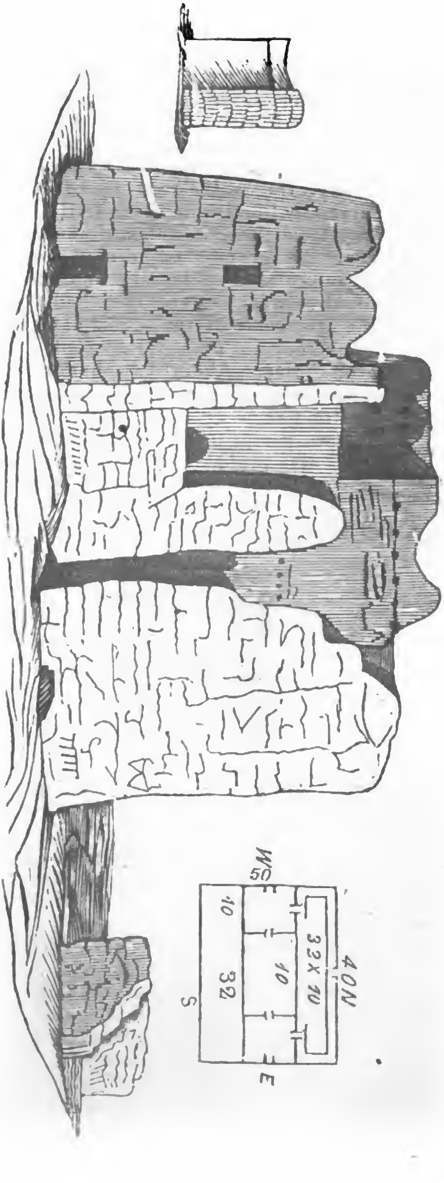
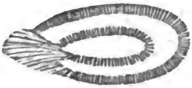
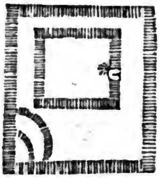


Aztec Ruins, near the Gila.

of low, broken wall. The large cara was 50 feet by 40, and had been four stories high, but the floors and roof had long since been burnt out. The charred ends of the cedar joist were still in the wall. I examined them, and found that they had not been cut with a steel instrument; the joists were round sticks, about four feet in diameter; there were four entrances—north, south, east, and west; the doors about four feet by two; the rooms as below, and had the same arrangement on each story; there was no sign of a fireplace in the building; the lower story was filled with rubbish, and above it was open to the sky; the walls were four feet thick at the bottom, and had a curved inclination inwards to the top; the house was built of a sort of white earth and pebbles, probably containing lime, which abounded on the ground adjacent; the walls had been smoothed outside, and plastered inside, and the surface still remained firm, although it was evident they had been exposed to a great heat from the fire; some of the rooms did not open to all the rest, but had a hole a foot in diameter to look through; in other places, were smaller holes. About two hundred yards from this building was a mound in a circle a hundred yards around; the centre was a hollow, 25 yards in diameter, with two vamps or slopes going down to its bottom; it was probably a well, now partly filled up; a similar one was seen near Mount Dallas. A few yards further, in the same direction, northward, was a terrace, 100 yards by 70. About five feet high upon this,





was a pyramid about eight feet high, 25 yards square at top. From this, sitting on my horse, I could overlook the vast plain lying northeast and west on the left bank of the Gila; the ground in view was about 15 miles, all of which, it would seem, had been irrigated by the waters of the Gila. I picked up a broken crystal of quartz in one of these piles. Leaving the "cara," I turned towards the Pimos, and travelling at random over the plain, now covered with mesquite, the piles of earth and pottery showed for hours in every direction. I also found the remains of a sicia, which followed the range of houses for miles. It had been very large. When I got to camp, I found them on good grass, and in communication with the Pimos, who came out with a frank welcome. Their answer to Carson, when he went up and asked for provisions, was, "bread is to eat, not to sell; take what you want." The general asked a Pimo who made the house I had seen. "It is the Cara de Montezuma,"

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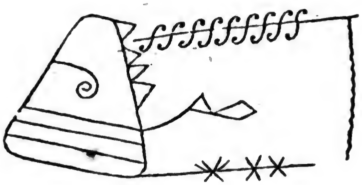
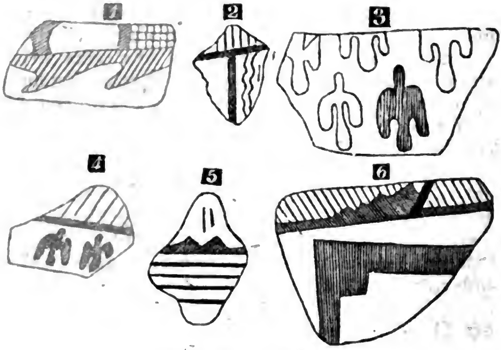
said he; "it was built by the son of the most beautiful woman who once dwelt in yon mountain; she was fair, and all the handsome men came to court her, but in vain; when they came, they paid tribute, and out of this small store, she fed all people in times of famine, and it did not diminish; at last, as she lay asleep, a drop of rain feel upon her navel, and she became pregnant, and brought forth a boy, who was the builder of all these houses." He seemed unwilling to talk about them, but said there were plenty more of them to the north, southwest, &c. He said when he first knew this cara, it was in better preservation, but that it had been burnt too long ago for any of them to remember. I showed him the hieroglyphic, but he did not understand it. Some other Pimos and



Coco Maricopas arrived, and messengers were sent to their village to buy watermelons and provisions, which soon came, although it was several miles. They wanted white beads for what they had to sell, and knew the value of money. Seeing us eating, the interpreter told the general he had tasted the liquor of Sonora and New Mexico, and would like to taste a sample of that of the United States. The dog had a liquorish tooth, and when given a drink of French brandy, pronounced it better than any he had ever seen or tasted. The Maricopa messenger came to ask the general what his business was, and where he was going. He said his people were at peace with all the world, except some of their neighbors, the Apaches; and they did not desire any more enemies. He was, of course, told to say to his chief that our object was merely to pass peaceably through their country; that we had heard a great deal of the Pimos, and knew them to be a good people. We were all struck with their unassumed ease and confidence in approaching our camp—not like the Apaches, who bayed at us like their kindred wolves, until the smell of tobacco and other (to them) agreeable things, gave them assurance enough to approach us. The Pimos and Coco Maricopas live alongside of each other, but are distinct people, speaking different tongues. The latter once lived near the mouth of the Gila. The Pimos have long lived at their present abode, and are known to all the trappers as a virtuous and industrious people. They and the Maricopas number over 2,000 souls. At the river, I saw a cinder, which might have been from the smelting of some ore.

November 11.—The Indians are still in camp, with their melons, corn, beans, and petiza molasses; they spent the night in our camp,

by the camp fires, without sleeping—talking and laughing incessantly. The interpreter of the Maricopas told Mr. Emory this morning that he could take him to a house north of the Gila larger than that we saw yesterday; being invited to go, I went, and found no house, but a mound 50 yards by 30, about 6 feet high, with loose basaltic rocks covering it; four slopes on top was loose stones, dirt, and pottery; around this, on the east side, a sort of low terrace, 100 yards on that side and 20 yards wide, terminated by loose stones, some of them set on edge. The mound ranged with the points of the compass; and, from the top of it, the whole adjacent country could be seen. In the vicinity, northwest, was a broad hole, surrounded by a mound similar in size and appearance to the well of yesterday, evidently once excavated, and filled up again. In the ruins, the guide said, ornamental stones, in vessels, were some times found after a rain; these the Pimos prize as ornaments, but cut them smaller. I found a small sea-shell, perforated, which had been worn as an ornament; other relics were picked up by Lieutenant Emory's party. The guide and other Indians informed me that on Salt river the ruins of these houses are more extensive; that an old secia is there yet plain to be seen many miles in length, and in every direction there are houses, some of them still standing lofty. This account has been given by various trappers, one of whom reports the old secia 30 miles in length. We returned towards the village, and found the camp in some of their corn-fields, which are separated by fences, and are all cultivated by irrigation, apparently with care; the cotton was still standing in some of the patches, but the frost had killed everything. The general had a talk with Ivan Antonio, the chief, and was welcomed by him; the people soon filled our camp, trading went on, and we got provisions enough, but only one beef and no mules; two thin mules being disdained for one fat one. The Indians, although they were crowding about our tents, and every thing was exposed to them, made no effort to steal anything.



Pottery found at the run.

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November 12.—Awoke this morning to hear the crowing of the cock and the baying of the watch-dog, reminding me of civilization afar off in the green valley of our country; we waited until 9 before starting; left some mules with the chief, Don Antonio, whose Indian name is Banbutt, and marched down through the settlements of the Pimos and Coco Maricopas, which are all south of the Gila, and encamped beyond them, (distance 15 miles,) under the base of a mountain lying west of the villages. The houses of

these Indians are all built alike: a rib work of poles 12 or 15 feet in diameter is put up, thatched with straw, and then covered on top with dirt, in the centre of this they build their fires; this is the winter lodge: they make sheds with forks, and cover them with flat roofs of willow rods for summer shelters. The heat is no doubt very intense here in summer, so that at midday one could scarce venture out on the soil barefoot. The Indians exhibit no symptoms of taciturnity; but, on the contrary, give vent to their thoughts and feelings without reason, laughing and chatting together; and a parcel of young girls, with long hair streaming to their waists, and no other covering than a clean white cotton blanket folded around their middle and extending to their knees, were merry as any group of like age and sex to be met with in our own country. The Pimos and Coco Maricopas have only recently got together. The fable of the Pimos is, that their first parent was caught up to heaven, and from that time God lost sight of them, and they wandered to the west; that they came from the rising sun; the others found themselves on the Colorado, and have since gradually got here by following the Gila. They are evidently a different race, speak entirely different tongues, but have adopted the same costume, and apparently the same habits; their houses are alike, and they unite in good principles. The chief of the Pimos said to the general that God had placed him over his people, and he endeavored to do the best for them; he gave them good advice, and they had fathers and grandfathers who gave them good advice also; they were told to take nothing but what belonged to them, and to ever speak the truth; they desired to be at peace with every one; therefore would not join us or the Mexicans in our difficulties. He shook hands with and bid us welcome, and hoped we might have good luck on our journey. He said we would find the chief of the Maricopas a man like himself, and one who gave similar counsel to his people. On our road, the interpreter of the Maricopas said the flat land we could see across the Gila, towards the mountains, through which debouch the Salt and San Francisco rivers, is filled with ancient ruins, and that some of the houses are still standing; that their people know nothing of the builders of them. Our route lay through the plain, overgrown, when it was not cultivated, with Frémontia or mesquite, &c. A string of cotton-woods border the river, and throughout the country there are no other trees. The road was dusty and dry; our camp in an extensive pasture, reaching for miles under the mountains. The vast number of people who once lived in this country, as shown by the

ruins, proves that, by irrigation, it might sustain a numerous people; but its resources will not be called into play by our people until thousands of acres of unoccupied land has been taken up elsewhere, unless this should get a value as a highway between the two oceans—a thing no doubt perfectly favorable, if a man of capital and energy should undertake to open a route between Galveston and China. The long hair of the men of the Pimos and Coco Maricopas is remarkable, reaching to their waists; they put it up in twist, and coil it over their heads at times, at others it hangs down the back; it is cut straight across the forehead in men and women, and protects their eyes from the sun. The men and women both have long hair, but the men the longest; they sometimes put it up as a turban, with mud; it grows very thick.

November 13.—Laid in camp until 12, preparatory to taking the journey of 40 miles without water. The second chief of the Coco Maricopas visited the general, the first being lame; he said we had seen his people, that they did not steal; they were probably better than some the general had seen; all his people had sold us provisions, it was good to do so, as people should exchange when they had articles to trade; but if we had come here hungry and poor, it would have been his pleasure to give us all we wanted without compensation. Afterwards the first chief came in, and offered like expressions of friendship and peace. For want of an interpreter, an old woman with a fine countenance was taken; she had half a watermellon in her arms, and was naked, except a cloth from her waist to her knees—a state of nudity which would seem inconsistent with modesty, but here she proved that modesty is independent of refined taste, for she took upon herself the office of interpreter, and performed it reluctantly, but with a very becoming modesty of manner. After making the chief a small present, we prepared to start, bringing our animals up and watering them at a well which we had dug, some of them drinking three pails full of water, as if in anticipation of a long reach without it; we started at 12 to cross the Tesotal, or forty miles without water or grass. Our route lay to the south of the mountains, below the Pimos, on the south side of the river Gila; for the first two miles we had a grass plain of salt grass, the ground in places crusted with salt and occasional pools of water. As we rose the slope of the higher ground we found the gravel of a disintegrated granite, but no granite in siter, which was our footing for many miles, bushes and pitahaya growing upon it, but no grass. After progressing four or five miles, the eye turned back, took in at a glance the vast plain, the mountains on the San Francisco, the Salt river, and the mountains towards Tucson, limiting, except in a few gaps, the southeast, where it was bounded by the horizon. This plain had once been the home of a mighty people, whose existence is ever a fable to the present dwellers on the soil. We continued our march west, and laid by at dark, and tied our animals fast to the stink-wood bushes, for there was no grass; here we rested until 3 o'clock in the morning.

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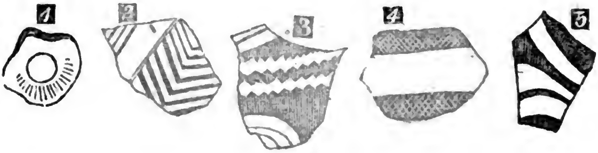
November 14.—When we saddled by the light of the moon and set out, the air was very chilly until sunrise; we passed a gap in the mountains, and emerged about sunrise upon another vast plain lying towards the Gila, with a mountain at some distance on either side; the sun produced wonderful effects with mirage; at the distance of the limits of the horizon, domes, walls, palisades, steeples, houses, and lakes were exhibited to us. About 10 o'clock we came to the river, and found our animals more anxious for grass than water, some of them did not drink. Along this stretch there is no growth but bushes and cactus, even a bait of grass could scarce be found, although there were places where grass had tried to grow, and failed for want of rain. If a contrivance for producing rain is ever put to test, necessity will invent it here; the idea is not absurd of making a rain—I have done it. After stopping at the river for a while to water, we marched down about four and a half or five miles and encamped on good grass half a mile from the river, the distance 44½ miles, the road firm and plainly marked, evidently very old. Near where we struck the river is the sign of an Indian village, but it is evidently recent, probably one of the stopping places of the Coco Maricopas on their progress up the river; they were here in 1827, when Dr. Anderson passed to California, and furnished him with guides. The camp we left 15 miles below the Pimos, Dr. Anderson calls the Salineta; the end of the Jornado he calls Tesotal. The mountains here, as elsewhere in this country, stand off in scattered peaks, scarcely taking any ranges; some peaks to the northwest of us are apparently very high.

November 15.—It rained on us quite briskly last night—the second rain since we left Santa Fé; the storm-cloud made its appearance in the northwest, on the mountains; the wind southeast; so it is probable the mass of the rain lay to the north of us. We may find it to have watered the desert on the north side of the Colorado; lay by all day, to give our animals a chance to recruit a little; killed a beef in the evening; we have two left, not being very successful in buying them from the Pimos; instead of eight, we got four; they were unwilling to sell them for anything but beads. I forgot to ask the Pimos for numerals beyond 10; but, as I have never yet seen a tribe (I have seen hundreds) which did not make use of decimals, compounding all higher numbers from 10, as we do; whether this refers to the first invention, or to the natural digits, I know not.

November 16.—Marched at half past 8, and continued down the river, the road being still an Indian trail, old and well beaten, through the alluvial bottom of the river, which, instead of being a black loam, moist with water, is here, as we have found it all along, still a bed of dry dust off the road, burrowed in every direction by field-mice, making it uncomfortable for man or beast to leave the beaten track; the country thinly covered, as usual, with mesquite bushes, stink-wood, &c., and the bare places—three-fourths of the land—destitute of all vegetation. We passed about nine miles out, a little grass in a dry slough; and 12 miles out, we found enough of coarse grass to halt to noon upon; about two miles from

the river, a little below this, we crossed a rocky ridge composed of limestone, capped and cut up with igneous rocks, and altered in its nature in places, showing that portions of it had once been rendered into quick lime, and now changed again into a substance resembling old mortar; this ridge had peaks upon it of various kinds of volcanic rock, and west of it, the upper plain had been covered with a black seam of basalt for many miles. Above this, on the north side of the river, there is a mountain peak of volcanic rock standing between two peaks formed by the beds of igneous rocks which it has split asunder and upheaved, as it rose from the great internal reservoir of heat. The road was lined with the remains of

ancient houses, the broken stones and pottery being the only indications for nine miles. I followed this line of houses. In many places, quantities of sea shells, broken, were to be seen; and I found two or three shells which had been changed in shape, for some purpose of ornament. Of the pottery, a few pieces, only, were



colored. After crossing the ridge, we came to a small hill of volcanic rocks, upon which the Indians had marked, in a rude manner, a vast number of hieroglyphics. The place is frequented still by Indians, as their marks were still visible, and places where they appear to have ground corn, or made medicine. A few miles further brought us to the river, where we found no grass, but plenty of cane along the border of the stream. The country we have passed over to-day affords no pasture, but a great quantity of land capable of producing by irrigation. It never rains here in summer time. Query —why? Our camp is opposite to a blue basaltic peak, with nothing but an occasional tuft of something like grass upon it, and that in streaks down its sides, as if the seed had followed the streams of rain, as they flowed to the level. Distance, 20½ miles.

November 17.—Marched at 8, and continued down the left bank; our first two miles through a deep sand, the former bed of the river; very bad travelling; we crossed a small dry dusty bottom, and came to a creek, in the bed of which we found a good deal of grass; we halted to graze the animals a few minutes, and then ascended the basaltic beach about 50 feet high, and did not see the river for seven or eight miles. Here, again, on the alluvial bottom, we found some tufts of grass, where we nooned it for half an hour, and

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then came to camp, about, distance, 18 miles, with a good deal of hunting along the river, the brush being quite thick. We got a camp on both sides of the river, with a very small allowance of grass and cane. We weather out, however, and remain till morning; to get this camp, we had to leave the trail. The course of the river here appears to be west southwest. On the right bank of the river, this evening, there appears to be a very extensive alluvial plain, reaching for miles from the river. No evidence of former habitation was seen. There were on some of the volcanic rocks which we passed, some marks like those of yesterday. About midday, we saw some old trail roads leading south. A deer was killed by one of the servants, and Carson caught a beaver; a hare crossed our path; a few little birds; the ravens, as usual, and a number of flocks of geese and ducks were all the animate objects we saw; the land might produce grapes and grain, but the people of this region will not be ever able to keep cattle unless rains are produced, for there is literally no pasture; a scanty camp may now and then be found. If we were supplied with boats, we could easily float to the mouth of the river. There is no timber here, however, out of which a canoe could be dug. Our road was rocky and rough today in many places.

November 18.—Marched at a quarter past 8, and passed close to a rock of basalt, upon which various Americans had scratched their initials and names. This point Carson called "Independence Rock." Here there had been a little grass, which had been grazed off. We travelled 16 miles, and found a good nooning place in a slough, which we left for the rear, and came on over the table-land for 10 miles, and encamped on the left bank of the river, at a scanty camp in a slough, containing pools of water saturated with salt. Distance, 20 miles west southwest. The belt of table-land here, from mountain to mountain, is about 15 miles, with plains running up between the peaks. This table-land is composed of small pebbles of all the rocks I have seen on the Gila, very much rounded by attrition. These are cemented by carbonate of lime into a concrete about as hard as what would be made by common mortar. The peaks on both sides of the river are very rugged, particularly on the north, one of them looking like a large city on a hill three or four miles below our camp. On the plain near the Gila, is a black pyramid of basalt, standing isolated, and about 300 feet high. On

the high plain, we found little tufts of grass under the bunches of Frémontii; the country almost bare, and only an occasional mesquite tree, and no tree on the mountain. On the plains of the river this morning, saw some sign of former habitation, but very little; two of our mules were abandoned to-day.

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November 19, (*Thursday.*)—Awoke at day-dawn, as usual, and found ice half an inch thick, and the air very cold. We climb the table-bench again 30 feet, and travel until we gradually get into the bottom of the Gila again, at the point of Bighorn mountain, where Carson shot a doe of the Bighorn or mountain sheep. This animal had the face of the sheep, but with very short hair all over; its horns were like those of the common wether; its color in the face, like the face of a dun cow; back and sides reddish grey, and the buttocks white—the white running down with a distinct line of demarcation to the hocks. The animal probably weighed 70 pounds; it had a very short tail, about two and a half inches; the foot very like a sheep; several of the males showed themselves on the cliffs, up which they climbed with great facility; their horns were very large, and their appearance much different from the female; it is said their horns sometimes weigh more than their bodies. The mountain upon which they disappeared is a coarse amygdaloid of granite and sienite, the current of which was a sort of granite, probably the debritus. West of this point, there were strata of dark-colored slate, alternately with sandstone and coarse granite amygdaloid, (their strata and their laminal;) the fields very much broken; at one point dipping south; a hundred yards further, dipping west, and again vertical; the mountain range was narrow, and ran off southeast; and beyond, in that direction, it appeared to change in character. The diluvion was the same as yesterday, except that west of the Bighorn, it had more sand, which, in places, had drifted into heaps. Distance, 19½ miles, west southwest. Encamped on abundance of coarse grass, in what recently had been the bed of the river, the channel being now a few hundred yards north; the bottom of the river abounded in places incrusted with salt, and grown with a vegetable with round pulpy leaf,

peculiar to the salt plains. The same has been the case since we lost sight of former habitations, rendering it probable that this land will not produce by cultivation. Off the salt plains, the vegetation was very much the same as above, but a little thinner; no timber on mountain or hill; in fact, Bighorn did not support a shrub; the cotton-wood on the border of the Gila, being the only apology for trees, and none of them very large. In 1771, a Franciscan friar (Padre Garcêz) describes the Gila as fringed with plenty of young cotton-woods, so that he could hardly see the river. We passed a little cane in a slough east of the point of the Bighorn, enough for a dozen animals or so; which is the only place where any thing could halt for a single night, except this. Several of our animals fell far to the rear in coming to camp, and the only one of our beef cattle left was not to be found this morning. From this out, then, our food must be peas, beans, and corn, with mule-meat, if we should find it necessary to come to that.

November 20, (*Friday.*)—The morning cool; ice formed in our vessels; Captain Moore reports that one of his sick men had fallen to the rear; orders were given to start one hour later than usual; the man came up in the night; marched at a quarter past 9, and

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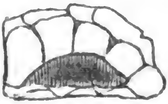
scended the diluvial bench, which we found very sandy; and off o our left, in the southeast, we could see a very long sand-heap, ying near the van of Bighorn mountain; the plain reached to the outh and northwest, to the limits of the horizon, in places; in thers, intercepted by mountain peaks, which stood upon the surace, as if built, although fantastic in shape, steep, and rugged; the oad was loose, and hard upon the animals—the pebbles and sand. Ve got into the bottom of the river about six miles out, where we ound the travelling very bad, on account of the dry dust and brush. Encamped about three-quarters of a mile from the river, opposite a umber of salt lakes, which were very miry; our animals, several f them, got in, and one tired mule did not get out. The difficulty f finding the river kept the men late in the night before they got hrough with getting water to cook with; these salt lakes would ot suit. Ducks and geese abounded. Distance, 16 miles. About ix miles out, where we descended the diluvion, we passed a mountain of greyish basalt, and some evidence of displaced strata of coarse slate and amygdaloid at the base. We are approaching the Colorado, and hope to find it within 40 miles. Our animals begin o show the effects of the hard service, and many of them no doubt are destined to leave their bones to bleach on the desert west of the Colorado.

November 21, (*Saturday.*)—Marched at the usual hour, our animals looking bad, from the effects of cold and the salt water which they drank. After marching seven miles, we came to the river, and watered. Along it, at this point, opposite to a four-turretted

point of the mountain, on the north side, there appears to be all along the river a fair prospect for a camp; three miles further, and we came to a bottom in which we found a fine camp for this country. Grass enough for a halt, and the general determined to lay by for the day. The thickets on the Gila here are very difficult to get through at first, but the brush being Frémontii, and mostly dead, is not hard to break away. The cotton-woods on the river are on an average one foot in diameter, and 25 or 30 feet high. The road was bad to-day, impeded with loose stones of a sort of species changing to mica slate. The mountains to our southwest are composed of a loose-grained granite, which is so friable that it forms grottos, or oven-shaped cavities in its sides, the roof of which has



the form, in many cases, of the regular arch, which, in fact, would suggest that improvement in architecture, if it had not already been discovered. The granite is composed of a superabundance of quartz and mica.

November 22, (*Sunday.*)—Marched at the usual hour, and continued down the Gila. On the left bank, the first eight or nine miles,

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the road was rough; passed through a cañon; the cañon was wide, but we had to clamber along the edge of the hills; in many places, the road was insecure, from its being a long declivity. After leaving this cañon, we found ourselves in a bottom which lay to the west, and which proved to be the delta between the Gila and Colorado; we marched about twenty-one miles, and found ourselves near the junction of those rivers. We here discovered the greatest abundance of recent signs of horses, and began to think in truth th t General Castro may have returned from *Sonora* with a large mounted force, to regain possession of California. The signs proved to be very fresh, and indicated that to whom they belonged they were not more than half a day off. The speculations of course were various, and all the knowledge of sign-studying put in practice. Carson went down the river and discovered fresh signs of fires of half a dozen messes, with no military regularity, and a trail coming from the crossing, half a mile wide, indicating a great number of loose animals. No trail could be discovered leading away from this place; the signs of very few men could be seen, a woman's track was found, a dead colt, colt tracks, and finally, straggling men were seen. Fires were discovered in the bottom up the Gila, and Lieutenant Emory went with 20 men to reconnoitre them, and found the camp of a party of Spaniards from California, with 400 or 500 animals, going to Sonora; he brought some of them to camp, and, as usual, they lied so much that we could get very little out of them. One of them told us, in confidence, that we would find 800 men in arms at the Pueblo opposed to the Americans, and that a party was at San Diego friendly to the United States of 200, and that three ships of war, he heard, were at San Diego, and advised us to be on our guard as we advanced. One of the others said, the Mexicans were quiet at the Pueblo, and that the Americans had quiet possession of all the country. They were dismissed for the night; and the general determined not to lose so good a chance to get fresh animals. Camp on dry grass, in the sand hills.

November 23—Monday.—The Mexicans came to camp on poor animals, and said they had no very good ones; they evidently are disposed to be shy and uncommunicative; one of them, who reported in confidence about the 800 men at Angelos, tells us that they had killed several Americans at the Pueblo. They say the Jornada is 50 miles without water; that they were lost upon it, and

Mountains—Mouth of Gila and Colorado.

found water half way by accident. One of them was caught by Lieutenant Emory with a bundle of letters, some of which were to General Castro; one giving an account of the rising of the Mexicans, and placing one Flores at their head, at the Pueblo de los Angelos; another letter, to a different person, was to the effect

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that 80 Mexicans (cavalry) had chased 400 Americans at the ravines (corbean?) between the Pueblo and San Pedro, and had driven them back, and had captured a cannon called the Teazer. The letters being opened, were resealed by Capt. Turner, and all returned to the man, who was discharged. These fellows tell various stories about the ownership of the horses; they all acknowledge that a part of them belong to General Castro. We are encamped one mile and a half south of the junction of the Gila and Colorado; these two rivers join together and run through a stone hill, through which they have broken a passage, although there are bottom lands on either side of the hill by which they may once have flowed; the place is remarkable, and being the junction of two important rivers, both of which are to a certain degree navigable, this point being also a point in the route from Sonora to California, may one day fill a large space in the world's history. The Colorado disappears from here in a vast bottom; the last we can see of its cotton-woods is in the southwest, beyond which lies a low range of mountains, whether on the right or left bank, is not plain, probably on the right bank. Toiling about through the sand hills in thick boots, one is convinced that to perform a journey on foot in this country, a moccasin, with a thick but elastic sole, is far preferable to the boot. The condition of our animals is sad enough to take the Jornada. Poor animals, that have come with us from the United States will lay their bones on the desert; some of the few horses we brought through are not able to go on; an animal fat, and well rested in New Mexico, could have come through. It is necessary in this country of loose stones to look at least once a day into the feet of shod animals, otherwise you may have them lamed by a loose stone getting in the shoe.

November 24.—Completed our trading with the Mexicans; Captain Moore's men being in part remounted on wild horses, on which never man sat, they got of course many tumbles, but they stuck to the furious animals until they succeeded. One old Mexican said, "Why those fellows can ride as well as us, if they had good horses; they are not a bit afraid!" We got off about 10 o'clock, and marched about ten miles to the river, and encamped on the sand bar, the willows being about 10 feet high and thick, with a good deal of grass mixed with their roots; the river is perhaps one third of a mile wide, and about four feet of water in the channel; its color is like that of the Arkansas at Fort Smith, and resembles that river where its banks are lowest; the banks of the Colorado are about six feet above the water now low. The bottom, on the river here is about ten miles wide, and much of the land could bear cultivation; it is all now overgrown with almost impenetrable thickets of willows, mesquite, Frémontia, &c. We did not dare to let our animals loose, as we could not hope to see them again. We followed the trail of the horse drovers, and found four animals which they had lost, two of which we secured; but the others got off before our New Mexican arrieros could lasso them, they not being so expert with the noose as the Californians. The mare we took soon was carrying a dragoon about; the other, a colt, we design for food, as we are now

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without meat. The Colorado would at all seasons carry steamers of large size to the future city of La Vaca, at the mouth of the Gila. A few geese and brant were to be seen on the river.

November 25.—Marched at a quarter past 9, and crossed the river, Carson having found the ford for us; we all got over safe, but the water was deep for small mules; it being cold, the mules had to be kept in motion after getting over, for they were disposed to roll in the dry sand. We found the thicket on the right bank much more dense in places than on the left. After about five miles we came to a range of sand hills which border the bottom on the north side, and we skirted the base of these for 10 miles, and halted at an old Indian well, which we dug out, and found water at about 9 feet below the bottom of the ravine—there was once an Indian village; and in our ride to-day we passed an old secia, of various sizes, of former cultivation. The sand on the north is in motion a floating mass like snow drift, and extends no doubt far into the plains; whether it came from the bars of the Colorado is not certain, but it is probable it covers the plain, which is of the the usual diluvial character, perhaps 30 feet thick. Our animals found the beans of the mesquite palatable, and ate them like corn where there were any old hands to show them how; they covered the ground in many places. We packed some grass for them to-day, and they will do pretty well to-night, except for water, which is scarce for man—the waters being like those at the pool of Silioam of old.

November 26.—Marched at half past 6, at sunrise, and took the jornada, and expected to find the place where the Spaniards had watered their horses as they came out, but after riding 22 or 23 miles, we found ourselves at an old well, dug in the sand, in a dry creek in the plain, and no sign of the Mexican trail or the place where they found water. We examined the well and found water, but the prospect of watering 250 animals and 150 men at the well was gloomy enough; and it was necessary to decide whether to halt here, or run the risk, or go on without water for 60 miles—the command having been 30 hours without water. Now, the prospect was gloomy enough; but we halted, and, by dint of perseverance, dipping constantly, and with system, we got out abundance of water for all our animals and men; probably we took 800 or 1,000 buckets full of water out before morning—some of the horses taking five buckets full without stopping—the buckets holding about four gallons. We have nothing at our camp but the leaves of mesquite, but the animals pick at them for want of better food. The pods are eaten greedily by the animals, especially the California animals; they were quite abundant at the last camp. Our route was through the southern end of a long range of sand hills, stretching from the Colorado as far out in the plain to the north, and afterwards we came upon the plain of diluvial drift, with small rounded pebbles, of one of which I found the fragments several yards apart, but rounded and polished by attrition. On this plain there were places where grass grew abundantly for this country. We halted an hour, and let our animals pick; we were on a plain

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track all the way, and making towards the mountains on the west of the plain until we struck the well, (Alamo Solo.)

November 27.—Marched early, and set out for the 60 miles; after travelling a few miles we encountered the sand hills and heavy roads, and after 6 or 8 miles, fell upon a few patches of grama grass, which were very acceptable; we halted an hour, and set out, after getting out of our way to the northwest, finally came in the night (31 miles from the Alamo) to the salt lake; but, alas! the waters were bitter!—bitter! We halted for the night, lying until 4 o'clock, and got off a little before day.

November 28.—Reached the Carmisa at noon in a fog from the sea, (27 miles on our march of the 27th;) passed the bed of a former fresh water lake, muscles, spinelas, &c., secured a specimen of each, and the clay detritus of the bottom. This plain is covered in places with the small spinela, the shells are thin, and one would suppose easily decayed; from which it would appear that at no distant day this place, which is now a dry desert, from which the traveller will always turn away if he can, was once a permanent lake, probably bordered with the greenest products of the vegetable world, and cheering to the eye amidst the adjacent barren mountains. The muscle shells were found at the Alamo in the sands, several feet under the surface. In this plain water can be found by digging in any of the deep indentations or hollows; it needs a curb, built like a small log hut, to keep the walls of the well from caving in; the water can then be got by bailing with a shallow basin, taking out, after every bucket or two, a panfull of sand, which, being a sort of semi-fluid, rises in the well as the water is agitated. Our animals are now over the jornada; some of them we were obliged to leave, to perish on the plain, and of those several are the young horses which our men took from the drove at the mouth of the Gila. It is probable that the greatest trial during a horse's life is the first hard work he does, as it would be with a man. The Carmisa is a place in the pass of the mountain where a stream rises, and sinks again immediately. The water comes out warm, and flows freely in a clear little stream towards the plains, and half a mile down it is lost in the sand; around this water the carissa grows, and a species of salt grass. About this are hills of reddish clay-seamed gypsum, like those on the Canadian forks of the Arkansas; these strata are inclined in various directions, as they have been upheaved by the volcanic mountains on either side; the diluvion lays upon this unconformably, and also in places disturbed. The diluvion is composed of granite and silicious stones, more or less rounded, and thick seams of mud.

November 29, (*Sunday.*)—Marched at half past 8, and continued up the same hollow 20 miles; at 9, we came to some palmetto trees, at a spring of saltish water; on the road the agave abounded, and some of the flower stalks were just budding forth; although the road led up a hollow all day, still it appeared we were going down hill, as the mountains appeared higher on the right and left than those in front, and there were no trees on the hills to show the horizontal lines. The camp is in a narrow valley, with abundance

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of grass; it is called Bayou Cita. The mules appear to like the dry grass on the hill sides better. We are near a corn patch of some California Indians. We may consider ourselves as partly in the country. It looks poorly here. It must be said the distance over the jornada is 91 miles, or thereabouts; and to cross it properly, one should come to it prepared with a little corn for each animal—say a peck—and then it could be passed without difficulty, by making three or four days of it over the plains. The constant seeing pieces of pottery shows that Indians have traversed it time out of mind. In fact, at one place, was evidence of a former abode of Indians, (diggers,) as they are called—probably the lowest order of the human race—living on lizzards, bugs, seed, &c., and naked as they came into the world, except the covering of grass which the women hang around their loins. How far from being arrayed in purple and fine linen, and feasting sumptuously every day, or from the enjoyment of the fruits of man's intellect, in the bright pages of modern literature! The vegetation on the jornada is the creosote bush, the mesquite, the Fremontia, and occasionally patches of thin grass, mostly on the higher lands of it; a few willows grew on the dry stream, where we found the second well. Before leaving camp this morning, a mule was found cast in a hollow opposite to camp, and was not recognized as any one of those belonging to the column, but after getting it out, it proved to be a poor thing which had been abandoned to die 50 miles back, and which had followed our trail, and getting near camp, had mistaken the way, and got in bad ground, and fallen so as not to be able to extricate itself, the fog of the 28th no doubt being its salvation; it brought with it one other mule left back 30 miles, but it had passed several we would like to have seen come with it.

November 30.—Laid by at the Bayou Cita, to be a green spot, no doubt, in the memory of our animals. It would be considered a poor camp on the Arkansas, but here it is fine; the green grass reaches two or three miles along the narrow valley where the water comes to the surface, and then all is dry and barren again, except the greenness given by the stink-bush and its kindred plants, inhabitants only of dry places. A few willows on the water furnish fuel, and the mountains hang over, high and bleak, destitute of trees, and almost vegetation, composed of granite and other silicious rocks, rived and torn with the volcanic action, and seamed with volcanic matter. The granite is various in kind; some of it beautiful structure and micacious; the agave abounds, and the Indians have baked it in every direction, using as fuel the dried stalks of cactus, and bushes of various kinds. The fish-hook cactus is found here. Our men killed a horse to-day for food, the first animal we have found necessary to sacrifice for the satisfaction of appetite. Our men were inspected to-day. Poor fellows! they are well nigh naked—some of them barefoot—a sorry looking set. A dandy would think that, in those swarthy sun-burnt faces, a lover of his country will see no signs of quailing. They will be ready for their hour when it comes. I ascended one of the mountains near camp, and when about 3,000 feet above camp, found myself surrounded by peaks. I

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would have gone further, but was alone and exhausted; a fog overhung the west range, so that my view was cut off; else, in one direction, I think I might have seen the Pacific ocean; the mountain was covered with loose masses of granite, round; but whether by water or not, I could not tell; some of them, evidently fragments of the same piece, lay side by side.

December 1.—The first day of winter; we left camp at the usual hour, and found the air cold and chilly. The mountain peaks on the coast range are covered with snow slightly; the whole of yesterday, these peaks were covered with clouds which drifted off in loose masses over the desert. This morning, most of the clouds had disappeared, and a strong wind blew from the west. Our route for the day was devious through narrow passes, without any great elevation; a bad road for our little howitzers, and impassable, without work, for wagons. We marched 18 miles, and encamped at the vegus San Phillippe, near the deserted Indian village; the rocks were mostly of mica slate and granite; the water of the vegus is apparently fresh, but the adjacent swamp is salty, and the grass bad for animals, especially at this season. The grass, the long salty grass of the Del Norte, and the soda grass.

December 2.—Marched at the usual hour, our animals having spent a bad night from the cold and bad grass; the few remaining horses, except one, gave out to-day, having been purged by the grass, and very much weakened. Our route was now over a rolling country. About six miles, we met some Mexicans escaping out of the country, with women and children; we allowed them to pass free; they informed us of the existence of war still in this country, so that we count now upon meeting the enemy. It appears that there are no armed forces opposed to each other in the field, but that, generally, parties of California rancheros can be found in every quarter. We will probably have a long time with an unseen enemy, with no pitched battles. Arrived at Warner's ranch very unexpectedly to them. This point is about 60 miles from San Diego, and perhaps 80 from the Pueblo. It is occupied by an American, from Connecticut, who settled in this country, and became naturalized, married, &c. He is now on the main route leading to Sonora, and of course is very much exposed to both parties. He is now said to be a prisoner in the hands of the Americans. Our approach to California improves to-day, and we came part of the day under the shade of fine live-oak trees, and on the mountain tops, clumps of lofty pines; as we came to Warner's, we got upon the western slope of mountains, and here nature had made pretty successful efforts to clothe her nakedness; the shrubs and trees almost hid the rocks of the mountains, and the hills had grass in abundance, but still nothing like the luxuriant growth of the prairies of Missouri, but doubtless a most enchanting sight, when it is green, to one who has just crossed the desert. We found Warner's a place which would be considered a poor location in the United States, with a hot spring and a cold one on his place; a good place for stock, but bad for grain, one would think. We are told wheat yields thirty-fold. The labor is performed by California Indians, who are stimu-

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lated to work by three dollars per month and repeated floggings. We encamped a quarter of a mile west of the warm spring. Having heard of a herd of mules 15 miles hence, belonging to Flores, the insurgent chief, Lieutenant Davidson, with 25 men, was despatched with Carson and Sanders, to see if we could get a remount; they started at dark. A Mr. Stokes, an Englishman, who lives 15 miles hence, came to camp, and gave us information that Commodore Stockton was at Diego, with the larger part of his naval force, that he had to remain neutral. A letter was sent to Commodore Stockton, and it was determined to remain at this point until morning, and determine whether to march upon San Diego or the Pueblo, or to halt on the Sonora outlet, until it was known what was to be done with the American prisoners said to be in the hands of the rancheros. We hear that the Californians are very savage, killing any of their people whom they suspect of treachery, and forcing those who were unwilling to join them. We were struck with the fact that a furious wind blew in our faces as we approached the coast range, but after crossing it, we found all calm, and were told there had been no wind.

December 3.—Lieutenant Davidson and Carson returned about noon, with a large gang of tame and wild animals, most of which are said to belong to Flores, the Californian general. After them, came a party of French, English, and a Chillian, claiming their riding animals, as they were going out of the country, which the general gave them. Many of the animals from the herd were put into service, and arrangements made to secure the balance by driving them into some safe place in the mountains. Laid by for the rest of the day; did not have time to examine the Tawa Caliente; but it is said to be remarkable.

December 4.—Marched at 9, and took the route for San Diego, to communicate with the naval forces and to establish our dépot, not knowing yet in what state we would find the country. Marched 15 miles in a rain, cold and disagreeable, and encamped at St. Isabella, a former ranch of San Diego mission, now, by hook or by crook, in the possession of an Englishman named Stokes; here hospitality was held out to us—Stokes having gone to San Diego. We ate heartily of stewed and roast mutton and tortillas. We heard of a party of Californians, of 80 men, encamped at a distance from this; but the informant varied from 16 to 30 miles in his accounts, rendering it too uncertain to make a dash on them in a dark, stormy night; so we slept till morning.

Head-quarters of the army of the West,
San Diego, (*California*,) *January* 25, 1847.

The foregoing is a literal copy of the rough notes of my late aid-de-camp, Captain A. R. Johnston, 1st dragoons, who was killed at daybreak on the 6th December, 1846, in an action with the Californians at San Pasqual.

S. W. KEARNY,
Brigadier General.

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